HUMAN BIOLOGY
a record of research
DECEMBER, 1935
VOL. 7 No. 4

MENTAL DISEASE AMONG NEGROES IN NEW YORK STATE

BY BENJAMIN MALZBERG, PH. D.

New York State Department of Mental Hygiene, Albany, N. Y.

RACIAL differences with respect to mental disease, though of fundamental importance to psychiatry, have not, on the whole, received the thorough study they merit, owing to the inadequacy of much of the statistical data bearing upon the subject. This is especially true where the comparisons depend upon international statistics based upon institutional records of admissions. Not only is there an absence of a uniform international classification of mental diseases, but the recorded incidence of mental disease is influenced by varying policies with respect to provisions for treatment. It is therefore a difficult task to attempt to draw proper inferences concerning the relative incidence of mental disease among racial groups inhabiting different territories. The development of a uniform classification of mental diseases in the United States, however, permits of useful comparisons between the several elements of the population within our own borders.

The most obvious racial comparison in the United States is that between the negro and white populations. A special census of institutions for mental disease taken by the Federal Bureau of the Census included data for 1922. This census differed from its predecessors, by including statistics of patients with mental disease who were admitted for treatment for the first time to an institution for mental disease. It

is generally agreed that the annual rate of first admissions is the best available index of the prevalence of mental disease. The statistics for 1922 showed that 5,896 negroes were admitted for the first time to institutions for mental disease in the United States, providing an annual rate of 56.4 per 100,000 negro population. The white first admissions totalled 65,500, giving an annual rate of 69.5 per 100,000 white population.(1)

Closer analysis of the statistics reveals, however, that in only three of the geographical divisions of the United States—the South Atlantic, the East South Central and the West South Central—did the white rate exceed that of the negroes. In the other divisions the negro rates were in overwhelming excess over those of the white population.(2) Since the great bulk of the negro population is found in the three divisions above named, however, their low rates are sufficient to reduce that of negroes as a whole, to a degree apparently indicating that negroes have less mental disease than whites.

The explanation of the low rates of mental disease among negroes in the south is to be found in the lack of adequate provision for their treatment in institutions. This was pointed out very clearly in the following paragraph in the U. S. Census Bureau Publication on Insane and Feebleminded in Institutions in 1910.

> The fact that the negroes in the south have a lower ratio of admissions than the whites does not necessarily indicate that insanity is less prevalent in one race than in the other. The difference in the relative numbers admitted to asylums for the insane may be influenced by the local distribution of the two races, by their practice as regards taking steps to have the insane placed under institutional care or restraint, and by the relative sufficiency of the provisions made for caring for the insane of each race. What the effect of such factors may be it is difficult to determine, but it seems probable that they furnish at least a partial explanation of the differences between the two races as regards the proportionate numbers admitted to the institutions for the insane. It is furthermore probable that, because of illiteracy, poverty and ignorance among the negroes, cases of insanity, especially those which are forms of senile dementia, are less likely to be diagnosed or detected in this race than among the whites.(3)

Racial discrimination with respect to provisions for the treatment of mental disease does not exist in the State of New York. Hence the statistics of first admissions in this State furnish a good approximation to the relative incidence of mental diseases among negroes and whites. In 1922 the negroes in the State of New York provided 324 first admissions to hospitals for mental disease, an annual rate of 163.2 per

100,000 negro population. The white population, with 8,230 first admissions, had a corresponding annual rate of 80.9.(4) The negro rate exceeded that of the whites in the ratio of 2.0 to 1.

According to the Federal Census of April 1, 1930 there were on that day 12,150,293 whites and 412,814 negroes in the State of New York. Since the preceding census of January 1, 1920 the white population had increased by 19.4 per cent. The negroes on the other hand more than doubled in the same interval, increasing from 198,483 to 412,814. The presence of so large a negro population, under circumstances favorable to statistical analysis, provides an opportunity for a detailed analysis of the prevalence and types of mental diseases among them.

The following study is based upon the first admissions to all institutions for mental disease in the State of New York in the three fiscal years beginning July 1, 1928 and ended June 30, 1931. In this period a total of 1,841 negroes were admitted to the hospitals for mental disease, of whom 993, or 53.9 per cent, were males, and 848, or 46.1 per cent, females. In the same period a total of 26,765 white first admissions were received in these institutions. Of this total 14,922, or 55.8 per cent, were males, and 11,843, or 44.2 per cent, females. The sex ratios in the two groups do not differ significantly.

TABLE 1

First Admissions to the Several Classes of Hospitals for Patients With Mental Disease in the State of New York, Fiscal Years 1929-1931, Inclusive

	NEGRO			WHITE		
	Males	Females	Total	Males	Females	Total
Civil State hospitals	913	838	1,751	13,769	11,245	25,014
Hospitals for criminal insane..	62	10	72	431	58	489
Private licensed institutions*..	18	...	18	722	540	1,262
Total	993	848	1,841	14,922	11,843	26,765

* Practically all negroes in this group were under treatment in Federal hospitals administered by the United States Veterans Bureau.

There are three types of institutions for the care of mental patients in the State of New York, namely the civil State hospitals, the State hospitals for the criminal insane, and the private licensed institutions. It is interesting to compare the relative distributions of the first admissions in the two racial groups according to type of institution, as shown in Table 1.

Of the 1,841 negroes, 1,751, or 95.1 per cent, were admitted to the civil State hospitals; 72, or 3.9 per cent, to the hospitals for criminal insane, and only 18, or 1.0 per cent, to the private licensed institutions. The corresponding percentages among the 26,765 white first admissions were 93.5, 1.8, and 4.7, respectively. The outstanding differences are clearly in connection with the hospitals for the criminal insane, and the private licensed institutions, the negro percentage being significantly higher in the former, and lower in the latter. The small negro percentage of admissions to the private institutions clearly proceeds from their inferior economic status. The higher percentage of negroes among the criminal insane is associated with higher crime rates among negroes in general. The latter explanation also accounts for the sex difference in connection with hospitals for the criminal insane.

The significant comparisons are obtained by relating the several classes of first admissions to the general populations from which they were derived. On this basis the negro rate of first admissions to the civil State hospitals was 143.2 per 100,000 population; the corresponding white rate was 68.9 per 100,000 population. The negro rate was, therefore, in excess in the ratio of 2.1 to 1. The first admissions to the hospitals for criminal insane provided rates of 5.9 and 1.3 among negroes and whites, respectively, a ratio of 4.5 to 1. The rate of first admissions among whites to the private licensed institutions exceeded that of negroes, however, the rates being 3.5 and 1.5, respectively, or a ratio of 2.3 to 1.

The total negro first admissions to the several groups of institutions are distributed in Table 2 according to psychosis.

Dementia praecox included 543 cases, representing 29.5 per cent of the total first admissions. General paralysis, the next largest category, represented a total of 306, or 16.6 per cent. Manic-depressive psychoses followed with a total of 213, or 11.6 per cent. The alcoholic psychoses, with 184 first admissions, included 10.0 per cent. Psychoses with cerebral arteriosclerosis represented a total of 158 first admissions, or 8.6 per cent. The senile psychoses included only 55 cases, or 3.0 per cent.

Important sex differences are shown as follows. The manic-depressive psychoses included 16.0 per cent of the first admissions among female negroes, but only 7.8 per cent of the males. General paralysis, on the other hand, included 22.0 per cent of the male negroes and only 10.4 per cent of the females. The alcoholic psychoses included 13.4 per cent of the male negroes and only 6.0 per cent of the females. Smaller, but important differences, were shown in the senile psychoses, psychoses with cerebral arteriosclerosis, and dementia praecox, in all of which the percentages among the female negroes exceeded those of the males.

Corresponding data for the white population are shown in Table 3. As compared with the negroes, important differences are apparent, due primarily to the greater percentages of general paralysis and alcoholic psychoses among the latter. Thus general paralysis included 22.0 per cent of the male negroes, but only 13.6 per cent of the male whites. The alcoholic psychoses included 13.4 per cent of the male negroes but only 9.0 per cent of the male whites. Corresponding deficiencies among the negroes are shown in the senile psychoses, and in psychoses with cerebral arteriosclerosis. Thus the former included only 1.7 per cent of the male negro first admissions, but 6.9 per cent of the white. The latter included 7.8 per cent of the negroes, but 14.2 per cent of the male whites. The differences are even more striking among the females. General paralysis, for example, included 10.4 per cent of the female negro first admissions, and 4.2 per cent of the white females. The alcoholic psychoses included 6.0 per cent of the female negroes, but only 2.0 per cent of the female whites. In the senile psychoses and in those with cerebral arteriosclerosis, on the other hand, the female whites had higher percentages. In the former, female whites and female negroes had percentages of 12.0 and 4.5, respectively. In psychoses with cerebral arteriosclerosis the corresponding percentages were 13.4 and 9.6, respectively.

Smaller differences are seen in dementia praecox and in the manic-depressive psychoses. In the former the negro first admissions have higher percentages, though the difference between the males is not significant. In the manic-depressive psychoses the whites have higher percentages.

There are thus important qualitative differences between the negro and white first admissions. If a negro develops mental disease, the probability that he will have a given type of psychosis differs from that among the whites. There is a greater chance that the negro insane will

TABLE 2

Negro First Admissions to All Institutions for Mental Disease in the State of New York During the Fiscal Years 1929-1931, Inclusive

PSYCHOSES	NUMBER OF FIRST ADMISSIONS			PER CENT OF TOTAL FIRST ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 GENERAL NEGRO POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Traumatic	17	3	20	1.7	0.4	1.1	2.9	0.5	1.6
Senile	17	38	55	1.7	4.5	3.0	2.9	6.0	4.5
With cerebral arteriosclerosis	77	81	158	7.8	9.6	8.6	13.0	12.8	12.9
General paralysis	218	88	306	22.0	10.4	16.6	36.9	13.9	25.0
With cerebral syphilis	36	24	60	3.6	2.8	3.3	6.1	3.8	4.9
With Huntington's chorea	...	...	...	...	...	...	...	...	...
With brain tumor	...	...	...	...	...	...	...	...	...
With other brain or nervous diseases	12	4	16	1.2	0.5	0.9	2.0	0.6	1.3
Alcoholic	133	51	184	13.4	6.0	10.0	22.5	8.1	15.1
Due to drugs and other exogenous toxins	1	...	1	0.1	...	0.1	0.2	...	0.1

With pellagra	...	1	1	...	0.1	0.1	...	0.2	0.1
With other somatic diseases	11	37	48	1.1	4.4	2.6	1.9	5.9	3.9
Manic depressive	77	136	213	7.8	16.0	11.6	13.0	21.5	17.4
Involution melancholia	1	4	5	0.1	0.5	0.3	0.2	0.6	0.4
Dementia praecox	277	266	543	27.9	31.4	29.5	46.9	42.1	44.4
Paranoia or paranoic conditions	1	3	4	0.1	0.4	0.2	0.2	0.5	0.3
Epileptic psychoses	20	20	40	2.0	2.4	2.2	3.4	3.2	3.3
Psychoneuroses and neuroses	...	3	3	...	0.4	0.2	...	0.5	0.3
With psychopathic personality	18	27	45	1.8	3.2	2.4	3.1	4.3	3.7
With mental deficiency	38	30	68	3.8	3.5	3.7	6.4	4.8	5.6
Undiagnosed psychoses	31	29	60	3.1	3.4	3.3	5.3	4.6	4.9
Without psychosis	8	3	11	0.8	0.4	0.6	1.4	0.5	0.9
Total	993	848	1,841	100.0	100.0	100.0	168.1	134.2	150.6

TABLE 3

White First Admissions to All Institutions for Mental Disease in the State of New York During the Fiscal Years 1929-1931, Inclusive

PSYCHOSES	NUMBER OF FIRST ADMISSIONS			PER CENT OF TOTAL FIRST ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 GENERAL WHITE POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Traumatic	233	31	264	1.6	0.3	1.0	1.3	0.2	0.7
Senile	1,033	1,424	2,457	6.9	12.0	9.2	5.7	7.9	6.8
With cerebral arteriosclerosis	2,111	1,587	3,698	14.2	13.4	13.8	11.6	8.8	10.2
General paralysis	2,025	499	2,524	13.6	4.2	9.4	11.1	2.8	7.0
With cerebral syphilis	176	68	244	1.2	0.6	0.9	1.0	0.4	0.7
With Huntington's chorea	21	22	43	0.1	0.2	0.2	0.1	0.1	0.1
With brain tumor	29	14	43	0.2	0.1	0.2	0.2	0.1	0.1
With other brain or nervous diseases	220	143	363	1.5	1.2	1.4	1.2	0.8	1.0
Alcoholic	1,336	236	1,572	9.0	2.0	5.9	7.3	1.3	4.3

Due to drugs and other exogenous toxins...	43	46	89	0.3	0.4	0.3	0.2	0.3	0.3
With pellagra	1	4	5	*	*	*	†	†	†
With other somatic diseases	211	353	564	1.4	3.0	2.1	1.2	2.0	1.6
Manic depressive	1,441	2,180	3,621	9.7	18.4	13.5	7.9	12.0	10.0
Involution melancholia	278	533	811	1.9	4.5	3.0	1.5	2.9	2.2
Dementia praecox	3,855	3,107	6,962	25.8	26.2	26.0	21.2	17.2	19.2
Paranoia or paranoic conditions	130	153	283	0.9	1.3	1.1	0.7	0.8	0.8
Epileptic psychoses	286	216	502	1.9	1.8	1.9	1.6	1.2	1.4
Psychoneuroses and neuroses	194	310	504	1.3	2.6	1.9	1.1	1.7	1.4
With psychopathic personality	438	277	715	2.9	2.3	2.7	2.4	1.5	2.0
With mental deficiency	391	330	721	2.6	2.8	2.7	2.2	1.8	2.0
Undiagnosed psychoses	236	193	429	1.6	1.6	1.6	1.3	1.1	1.2
Without psychosis	234	117	351	1.6	1.0	1.3	1.3	0.6	1.0
Total	14,922	11,843	26,765	100.0	100.0	100.0	82.0	65.4	73.7

* Less than 0.05 per cent. † Less than 0.05 per 100,000 population.

TABLE 3

White First Admissions to All Institutions for Mental Disease in the State of New York During the Fiscal Years 1929-1931, Inclusive

PSYCHOSES	NUMBER OF FIRST ADMISSIONS			PER CENT OF TOTAL FIRST ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 GENERAL WHITE POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Traumatic	233	31	264	1.6	0.3	1.0	1.3	0.2	0.7
Senile	1,033	1,424	2,457	6.9	12.0	9.2	5.7	7.9	6.8
With cerebral arteriosclerosis	2,111	1,587	3,698	14.2	13.4	13.8	11.6	8.8	10.2
General paralysis	2,025	499	2,524	13.6	4.2	9.4	11.1	2.8	7.0
With cerebral syphilis	176	68	244	1.2	0.6	0.9	1.0	0.4	0.7
With Huntington's chorea	21	22	43	0.1	0.2	0.2	0.1	0.1	0.1
With brain tumor	29	14	43	0.2	0.1	0.2	0.2	0.1	0.1
With other brain or nervous diseases	220	143	363	1.5	1.2	1.4	1.2	0.8	1.0
Alcoholic	1,336	236	1,572	9.0	2.0	5.9	7.3	1.3	4.3

Due to drugs and other exogenous toxins...	43	46	89	0.3	0.4	0.3	0.2	0.3	0.3
With pellagra	1	4	5	*	*	*	†	†	†
With other somatic diseases	211	353	564	1.4	3.0	2.1	1.2	2.0	1.6
Manic depressive	1,441	2,180	3,621	9.7	18.4	13.5	7.9	12.0	10.0
Involution melancholia	278	533	811	1.9	4.5	3.0	1.5	2.9	2.2
Dementia praecox	3,855	3,107	6,962	25.8	26.2	26.0	21.2	17.2	19.2
Paranoia or paranoic conditions	130	153	283	0.9	1.3	1.1	0.7	0.8	0.8
Epileptic psychoses	286	216	502	1.9	1.8	1.9	1.6	1.2	1.4
Psychoneuroses and neuroses	194	310	504	1.3	2.6	1.9	1.1	1.7	1.4
With psychopathic personality	438	277	715	2.9	2.3	2.7	2.4	1.5	2.0
With mental deficiency	391	330	721	2.6	2.8	2.7	2.2	1.8	2.0
Undiagnosed psychoses	236	193	429	1.6	1.6	1.6	1.3	1.1	1.2
Without psychosis	234	117	351	1.6	1.0	1.3	1.3	0.6	1.0
Total	14,922	11,843	26,765	100.0	100.0	100.0	82.0	65.4	73.7

* Less than 0.05 per cent. † Less than 0.05 per 100,000 population.

belong to the groups with general paralysis or alcoholic psychoses. On the other hand, the negro insane are far less likely to belong to a group of psychoses associated with advanced age.

This type of probability is of considerable interest in the study of mental disease, but it has on many occasions been confused with the general probability of mental disease, in consequence of which wrong conclusions have been drawn.

For example, in a study based upon admissions to the Manhattan State Hospital, Dr. George H. Kirby divided his cases into several racial groups, and then allocated the cases in each group, on a percentage basis, into classes of psychoses. Analyzing these percentages he concluded: "The alcoholic disorders are lower in the negro than in any other race except the Hebrew . . . . manic-depressive insanity seems to be infrequent in the negro, the percentage being in fact lower than that found in any other race."(5) Dr. Pearce Bailey drew similar conclusions based upon the percentage distribution of mental diseases among 8,401 negro soldiers with neuropsychiatric disorders in the United States Army during the World War. "A high distribution of mental defect and a low distribution rate of alcoholism is found in this race. The low alcoholic distribution exists in spite of the fact that the alcoholic habits of negroes are about the same as of whites. From this comparison it appears that the negro can be practically as intemperate as the white man without paying the penalty for it."(6)

Such conclusions, however, cannot be derived from percentage distributions, for it is possible for one race to show a higher percentage with a given psychosis, and yet have a lower rate of first admissions. Thus the manic-depressive psychoses included 11.6 per cent of the negro first admissions in the State of New York during the fiscal years 1929 to 1931, inclusive, and 13.5 per cent of the white first admissions. Yet it will be shown shortly that the negroes have higher rates of manic-depressive psychoses than the white population. The most reliable measure of the probability of mental disease is the annual rate of first admissions, i.e., the number of first admissions per 100,000 of the same general population.

Such average annual rates for the three years 1929 to 1931 inclusive are shown for the negro population of the State of New York in Table 2. The average annual rate of first admissions was 150.6. The outstanding category was dementia praecox which provided a rate of 44.4. General paralysis followed with a rate of 25.0. Manic-depressive psychoses, alcoholic psychoses and psychoses with cerebral arteriosclerosis followed in the order named with first admission rates of 17.4, 15.1, and 12.9, respectively.

The sex differences are marked. Dementia praecox was highest among the males with a rate of 46.9. General paralysis and alcoholic psychoses followed with rates of 36.9, and 22.5, respectively. The manic-depressive psychoses, and psychoses with cerebral arteriosclerosis followed, each with a rate of 13.0. Among the females dementia praecox was again the outstanding category, though slightly less prevalent than among males, the rate being 42.1. The manic-depressive psychoses followed with a rate of 21.5, greatly in excess of that of the males. Thus the manic-depressive psychoses, fourth in frequency among the males, ranked second among the females. Then came general paralysis with a rate of 13.9, and psychoses with cerebral arteriosclerosis, with a rate of 12.8. The alcoholic psychoses followed with a rate of 8.1, in contrast to a rate of 22.5 among the males. In the senile psychoses the rate of 6.0 among the females is in marked contrast to the low rate of 2.9 among the males.

Corresponding data for the white population are shown in Table 3.

The average annual rate of first admissions was 73.7, a rate less than half that of the negroes. The highest rate occurred in dementia praecox, where the rate was 19.2, compared with a rate of 44.4 among the negroes. Psychoses with cerebral arteriosclerosis ranked second among the whites, with a rate of 10.2. This rate was only slightly less than that among the negroes, but the relative order was different, for this psychosis ranked fifth among the negroes. The manic-depressive psychoses ranked third among the whites with a rate of 10.0, compared with 17.4 among the negroes. General paralysis followed with a rate of 7.0, far less than the rate of 25.0 among the negroes. The senile psychoses presented a rate of 6.8 among the whites, exceeding the corresponding rate among the negroes. There is a wide discrepancy in the alcoholic psychoses in which the negro rate (15.1) exceeds that of the whites (4.3).

Differences by sex are marked. White males had an average annual rate of 82.0, compared with 168.1 among negroes. The rank order of the leading groups of psychoses among the white males was as follows: dementia praecox, 21.2; psychoses with cerebral arteriosclerosis, 11.6; general paralysis, 11.1; manic-depressive psychoses, 7.9; alcoholic psychoses, 7.3; senile psychoses, 5.7. Among negro males the rank order was as follows: dementia praecox, 46.9; general paralysis, 36.9; alcoholic psychoses, 22.5; manic-depressive psychoses and psychoses with cerebral arteriosclerosis, each with a rate of 13.0. Psychoses with

mental deficiency and psychoses with cerebral syphilis followed in the order named with rates of 6.4 and 6.1, respectively, greatly in excess of the corresponding rates among the white males.

White females had an average annual rate of first admissions of 65.4, compared with 134.2 among negro females. Among the former the ranking of the psychoses was as follows: dementia praecox, 17.2; manic-depressive psychoses, 12.0; psychoses with cerebral arteriosclerosis, 8.8; senile psychoses, 7.9; involution melancholia, 2.9, and general paralysis, 2.8. Among the negro females the rank order was as follows: dementia praecox, 42.1; manic-depressive psychoses, 21.5; general paralysis, 13.9; psychoses with cerebral arteriosclerosis, 12.8; alcoholic psychoses, 8.1; senile psychoses, 6.0.

More detailed statistics of rates of first admissions are shown in the following sections for all psychoses combined, and for several of the leading groups of psychoses.

ALL FIRST ADMISSIONS

The 1,841 first admissions among negroes to institutions for mental disease in the State of New York during the three years ended June 30, 1931 provided an average annual rate of 150.6 ± 4.1 per 100,000 general negro population. The corresponding rate among the white population was 73.7 ± 0.5, the negro rate being in excess in the ratio of 2.0 to 1. Among males the rates of first admissions were 168.1 ± 6.2 and 82.0 ± 0.8 for negroes and whites, respectively, a ratio of 2.1 to 1. Among females the rates of first admission were 134.2 ± 5.4 and 65.4 ± 0.7 for negroes and whites, respectively, a ratio of 2.1 to 1.

The age distribution of the negro first admissions, together with corresponding rates of first admissions are shown in Table 4.

There was a rate of first admissions of 7.3 per 100,000 population aged 14 years and under. The rate rose steadily and without interruption to a maximum of 749.1 at 75 years and over. With two exceptions the rates were higher among males than among females. Among the former there was a rate of 8.7 at 14 years and under. The rate rose to 171.7 at ages 20 to 24, and then declined to 160.9 at ages 30 to 34. Thereafter the rates grew steadily to a maximum of 928.3 at ages 70 to 74. There was a decline to a rate of 543.1 at 75 years and over, but there are, very likely, random fluctuations at 70 years and over, due to the small negro populations in these age intervals. Among the females

TABLE 4

Ages of Negro First Admissions to All Institutions for Patients With Mental Disease in the State of New York During the Fiscal Years 1929 to 1931 Inclusive, and Average Annual Rates of First Admissions per 100,000 General Negro Population

AGE (*Years*)	NUMBER OF FIRST ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 GENERAL POPULATION		
	Males	Females	Total	Males	Females	Total
Under 15	7	5	12	8.7	5.9	7.3
15-19	42	52	94	118.2	113.4	115.5
20-24	107	92	199	171.7	115.2	140.0
25-29	137	115	252	165.3	124.9	144.1
30-34	119	127	246	160.9	173.1	167.0
35-39	142	121	263	209.0	182.4	195.9
40-44	114	94	208	238.6	204.4	221.8
45-49	107	73	180	293.3	207.4	251.1
50-54	76	45	121	322.7	199.8	262.6
55-59	47	34	81	365.9	265.0	315.5
60-64	36	23	59	481.9	275.0	372.6
65-69	22	23	45	533.3	393.4	451.3
70-74	21	13	34	928.3	400.6	617.4
75 and over	12	31	43	543.1	877.9	749.1
Unknown	4	...	4	....	....	....
Total	993	848	1,841	168.1	134.2	150.6

there was a rate of 5.9 at 14 years and under. With but one exception (at 50 to 54 years) the rate grew steadily from interval to interval, reaching a maximum of 877.9 at 75 years and over.

The corresponding rates of first admissions among the white population are shown in Table 5. The trends are similar to those of the negroes, the rates growing from minima at 14 years and under, to maxima in old age. The levels of the rates, however, are much lower than those among the negroes. This is brought out clearly in Table 5 in which the rates of first admissions among the white population are compared with the corresponding rates among the negroes.

TABLE 5

Average Annual Rates of First Admissions to All Institutions for Patients With Mental Disease in the State of New York, by Age Groups, per 100,000 Corresponding General Population, During the Fiscal Years 1929 to 1931, Inclusive, With Ratios of the Corresponding Rates

AGE (*Years*)	AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG NEGROES			AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE WHITE POPULATION			RATIO OF RATE OF FIRST ADMISSIONS AMONG NEGROES TO THAT OF THE WHITE POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Under 15	8.7	5.9	7.3	6.5	4.4	5.5	1.3	1.3	1.3
15-19.....	118.2	113.4	115.5	45.4	31.3	38.3	2.6	3.6	3.0
20-24.....	171.7	115.2	140.0	83.4	53.4	68.0	2.1	2.2	2.1
25-29.....	165.3	124.9	144.1	83.4	64.6	73.8	2.0	1.9	2.0
30-34.....	160.9	173.1	167.0	91.0	76.3	83.7	1.8	2.3	2.0
35-39.....	209.0	182.4	195.9	104.3	82.6	93.6	2.0	2.2	2.1
40-44.....	238.6	204.4	221.8	109.0	94.4	102.0	2.2	2.2	2.2
45-49.....	293.3	207.4	251.1	112.8	91.7	102.6	2.6	2.3	2.4
50-54.....	322.7	199.8	262.6	123.6	101.3	112.7	2.6	2.0	2.3
55-59.....	365.9	265.0	315.5	132.3	104.3	118.3	2.8	2.5	2.7
60-64.....	481.9	275.0	372.6	157.4	113.7	135.1	3.1	2.4	2.8
65-69.....	533.3	393.4	451.3	199.1	147.7	172.6	2.7	2.7	2.6
70-74.....	928.3	400.6	617.4	280.1	213.1	244.9	3.3	1.9	2.5
75 and over	543.1	877.9	749.1	403.8	339.7	367.8	1.3	2.6	2.0

Under 15 years of age the negro rate exceeded that of the whites in the ratio of 1.3 to 1. This was the lowest of all the ratios. At 15 to 19 years the corresponding ratio was 3.0 to 1, this being the maximum. It is possible, however, that this is an accidental fluctuation. Omitting this ratio there appears to be a tendency for the negro rate to exceed that of the whites in an increasing ratio with advancing age, at least through the interval 60 to 64 years.

The ratios show fluctuations when differentiated by sex, but in general there appears to be an increase in the size of the ratio with increasing age through 60 to 64 years among males, and 65 to 69 years among females. Clearly, therefore, the first admission rates of the negroes increase with age more rapidly than those of the white popu-

lation. It may also be noted that in general there is a greater relative disparity in the male rates than in the female rates.

The correlation between age and the rate of first admission draws attention to the fact that it is necessary to consider the age constitution of the two populations, before it is possible to draw correct conclusions as to the relative incidence of mental disease. The general populations may be so distributed in age that they weight the specific rates unevenly. An examination of the age constitutions of the negro and white populations of the State of New York shows that in fact such is the case.

The negro population of the State of New York is considerably younger than the white population. Negroes had an average age of 28.6 ± 0.02 years on April 1, 1930, compared with an average of 48.2 ± 0.003 among the whites. As measured by the standard devia-

TABLE 6

Age Distribution, in Per cent, of the Negro and White Populations of the State of New York, According to the Federal Census of April 1, 1930

AGE (*Years*)	WHITE			NEGRO		
	Males	Females	Total	Males	Females	Total
Under 15	25.5	24.9	25.2	22.2	21.6	21.9
15-19	8.5	8.7	8.6	6.0	7.3	6.7
20-24	8.7	9.2	9.0	10.5	12.6	11.6
25-29	8.6	8.9	8.7	14.0	14.6	14.3
30-34	8.4	8.5	8.5	12.5	11.6	12.0
35-39	8.6	8.3	8.4	11.5	10.5	11.0
40-44	7.6	7.0	7.3	8.1	7.3	7.7
45-49	6.4	6.0	6.2	6.2	5.6	5.9
50-54	5.3	5.2	5.3	4.0	3.6	3.8
55-59	4.1	4.1	4.1	2.2	2.0	2.1
60-64	3.2	3.4	3.3	1.3	1.3	1.3
65-69	2.3	2.5	2.4	0.7	0.9	0.8
70-74	1.5	1.7	1.6	0.4	0.5	0.4
75 and over	1.3	1.6	1.4	0.4	0.5	0.5
Unknown	0.1	0.1	0.1	0.2	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

tion there was a greater age range among the white population, but the relative variation was greater among the negroes. The latter had a coefficient of variation of 55.6 ± 0.05 compared with 40.2 ± 0.006 among the whites. The complete distribution by age of the white and negro populations in per cent, is given in Table 6, which shows clearly the greater proportion of negroes in the age intervals from 20 to 24 years to 40 to 44 years, inclusive. The white population is in excess, on the other hand, at 45 years and over.

The same result is shown by the first admissions. The negroes averaged 39.3 ± 0.2 years of age, the whites 45.9 ± 0.05. The relative variation in age, however, was practically the same in the two groups.

It is clear therefore that the relative age distribution of the two groups must be considered in order to arrive at a truer picture of the general rates of first admission, since rates of first admissions increase with advancing age. As negroes predominate at the lower age levels, they would tend to have relatively lower rates than the whites. In

TABLE 7

Average Annual Rates of First Admissions to All Institutions for Mental Patients in the State of New York Among Negroes and Whites During the Three Fiscal Years Ended June 30, 1931

	MALES		FEMALES		TOTAL	
	Crude	Standardized	Crude	Standardized	Crude	Standardized
Negro (A)	168.1±6.2	251.4±8.6	134.2±5.4	194.6±7.3	150.6±4.1	224.7±5.6
White (B)	82.0±0.8	108.6±1.0	65.4±0.7	84.9±0.9	73.7±0.5	97.4±0.7
Ratio of (A) to (B)	2.1	2.3	2.1	2.3	2.0	2.3

Table 7 therefore, standardized rates of first admissions are given for both negroes and whites and compared with the corresponding 'crude' rates. Since there are practically no first admissions under 15 years

of age, the population chosen as standard was that of the State of New York, aged 15 years and over, as shown by the Federal census of April 1, 1930.

The standardized rate among the negroes was 224.7 ± 5.6 per 100,000 population; the corresponding rate in the white population was 97.4 ± 0.7. The negro rate was in excess in the ratio of 2.3 to 1. On the basis of 'crude' rates the two were in the ratio of 2.0 to 1. Corrections for age differences consequently increased the disparity between the rates of negroes and whites. Negro and white males had standardized rates of first admissions of 251.4 ± 8.6 and 108.6 ± 1.0, respectively, a ratio of 2.3 to 1. Among females the corresponding rates were 194.6 ± 7.3 and 84.9 ± 0.9, respectively, a ratio of 2.3 to 1. We may therefore conclude that negroes in the State of New York have rates of first admission significantly in excess of those of the white population, the rates, with due regard to the factor of age, being in the ratio of 2.3 to 1.

SENILE PSYCHOSES

In the three years ended June 30, 1931 there were 55 first admissions with senile psychoses among the negroes, giving an average annual rate of first admissions of 4.5 ± 0.7 per 100,000 population. Of the 55 cases 17 were males and 38 females, providing corresponding rates of first admissions of 2.9 ± 0.8 and 6.0 ± 1.1. The white population provided 2,457 first admissions with senile psychoses in the same period, an average annual rate of 6.8 ± 0.2 per 100,000 population. The 1,033 white males and 1,424 white females with senile psychoses had corresponding average annual rates of 5.7 ± 0.2 and 7.9 ± 0.2, respectively. On the basis of the crude rates, the white population had a rate in excess of that of the negroes in the ratio of 1.5 to 1. Among males and females the white rates of first admission exceeded those of the negroes in the ratios of 2.0 to 1, and 1.3 to 1, respectively. These differences, however, result entirely from the fact that the large totals of negroes at the younger age levels provide no cases of senile psychoses, whereas the white population had appreciable percentages in the older and susceptible age intervals. It is therefore necessary to compare the two groups with due regard to age differences. Standardized rates of first admissions are shown in Table 8. The standard population was that of the State of New York aged 45 years and over as shown by the Federal census of April 1, 1930.

TABLE 8

Average Annual Rates of First Admission With Senile Psychoses to All Institutions for Mental Disease in the State of New York Among Negroes and Whites During the Three Fiscal Years Ended June 30, 1931

	MALES		FEMALES		TOTAL	
	Crude	Standardized	Crude	Standardized	Crude	Standardized
Negro (A)	2.9±0.8	35.9±7.4	6.0±1.1	57.7±9.3	4.5±0.7	52.1±6.3
White (B)	5.7±0.2	23.2±0.9	7.9±0.2	27.1±0.9	6.8±0.2	27.6±0.7
Ratio of (A) to (B)	0.5	1.5	0.8	2.1	0.7	1.9

The negro population had a standardized rate of first admissions of 52.1 ± 6.3. Whites had a rate of 27.6 ± 0.7. Instead of being in defect, the negro rate was actually in excess in the ratio of 1.9 to 1. Among males the standardized rates were 35.9 ± 7.4 and 23.2 ± 0.9 for negroes and whites respectively, the former being in excess in the ratio of 1.5 to 1. The disparity was even greater among females, among whom negroes and whites had standardized rates of 57.7 ± 9.3 and 27.1 ± 0.9, respectively, a ratio of 2.1 to 1. Among both negroes and whites, the female rates were in significant excess over those of the males. The excess, however, was greater among the negroes, the standardized rates being in the ratio of 1.6 to 1 among the negroes and 1.2 to 1 among the whites.

PSYCHOSES WITH CEREBRAL ARTERIOSCLEROSIS

The increasing prevalence of arterial disorders in the general population has been associated with an increasing prevalence of psychoses with cerebral arteriosclerosis. This group of mental disorders now constitutes one of the major problems in mental hygiene. In the three years ended June 30, 1931 there were 158 first admissions with such psychoses among the negroes, of whom 77 were males and 81, females. The average annual first admission rate was 12.9 ± 1.2 per 100,000

population. Male and female negroes had corresponding rates of 13.0 ± 1.7 and 12.8 ± 1.7, respectively. The difference, however, is not statistically significant. In the white population there were 3,698 first admissions with psychoses with cerebral arteriosclerosis, of whom 2,111 were males and 1,587, females. The average annual first admission rate was 10.2 ± 0.2. Among males and females the corresponding rates were 11.6 ± 0.3 and 8.8 ± 0.3, respectively. The negro rates exceeded the corresponding rates among the whites. Among males the ratio of the rates was 1.1 to 1. Females had a corresponding ratio of 1.5 to 1. For both sexes combined the corresponding ratio was 1.3 to 1. The differences, however, are not statistically significant.

The age distribution of the negro first admissions and the corresponding rates are shown in Table 9.

TABLE 9

Ages of Negro First Admissions With Psychoses With Cerebral Arteriosclerosis to All Institutions for Patients With Mental Disease in the State of New York During the Fiscal Years 1929 to 1931, Inclusive, and Average Annual Rates of First Admissions per 100,000 General Negro Population

AGE (*Years*)	NUMBER OF FIRST ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 GENERAL POPULATION		
	Males	Females	Total	Males	Females	Total
35-39	1	2	3	1.5	3.0	2.2
40-44	2	6	8	4.2	13.0	8.5
45-49	4	9	13	11.0	25.6	18.1
50-54	11	9	20	46.7	40.0	43.4
55-59	13	13	26	101.2	101.3	101.3
60-64	20	13	33	267.7	155.4	208.4
65-69	8	11	19	193.9	188.1	190.5
70-74	13	7	20	574.6	215.7	363.2
75 and over	5	11	16	226.0	311.5	278.7
Total	77	81	158	13.0	12.8	12.9

With but two exceptions the rates of first admissions increased steadily with age. At 35 to 39 years there was a minimum rate of 2.2 per 100,000 population. The rate increased to a maximum of 363.2 at 70 to 74 years. Among males the rates increased from 1.5 at 35 to 39 years to 574.6 at 70 to 74 years. Among females there was a steady rise from a minimum rate of 3.0 at 35 to 39 years to a maximum of 311.5 at 75 years and over. The rates cannot be considered reliable, however, at 75 years and over.

These rates are compared with corresponding rates for the white population in Table 10.

TABLE 10

Average Annual Rates of First Admissions With Psychoses With Cerebral Arteriosclerosis to All Institutions for Patients With Mental Disease in the State of New York, by Age Groups, per 100,000 Corresponding General Population, During the Fiscal Years 1929 to 1931, Inclusive, With Ratios of the Corresponding Rates

AGE (*Years*)	AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG NEGROES			AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE WHITE POPULATIONS			RATIO OF RATE OF FIRST ADMISSIONS AMONG NEGROES TO THAT OF THE WHITE POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
35-39.....	1.5	3.0	2.2	0.1	0.3	0.2	15.0	10.0	11.0
40-44.....	4.2	13.0	8.5	1.3	2.1	1.7	3.2	6.2	5.0
45-49.....	11.0	25.6	18.1	3.9	5.1	4.5	2.8	5.0	4.0
50-54.....	46.7	40.0	43.4	14.9	13.7	14.3	3.1	2.9	3.0
55-59.....	101.2	101.3	101.3	35.7	31.3	33.5	2.8	3.2	3.0
60-64.....	267.7	155.4	208.4	65.9	47.6	56.6	4.1	3.3	3.7
65-69.....	193.9	188.1	190.5	103.8	66.8	84.2	1.9	2.8	2.3
70-74.....	574.6	215.7	363.2	149.2	83.9	114.9	3.9	2.6	3.2
75 and over	226.0	311.5	278.7	174.8	102.2	134.0	1.3	3.0	2.1

Among the white population the rates of first admission rose steadily with advancing age. At each age interval, however, the negro rate was well in excess of the corresponding rate in the white population. It may be noted that there is a tendency for the excess of the negro rate to decrease with age. In general too, the female ratio exceeds that of the males.

Since arteriosclerotic disorders are relatively infrequent under 45 years of age, it is necessary to consider the age distribution, precisely as in the case of the senile psychoses. Standardized rates are therefore presented in Table 11. The standard population is again that of the State of New York, aged 45 years and over on April 1, 1930.

TABLE 11

Average Annual Rates of First Admissions With Psychoses With Cerebral Arteriosclerosis, to All Institutions for Mental Disease in the State of New York, Among Negroes and Whites During the Three Fiscal Years Ended June 30, 1931

	MALES		FEMALES		TOTAL	
	Crude	Standardized	Crude	Standardized	Crude	Standardized
Negro (A)	13.0±1.7	131.9±14.2	12.8±1.7	101.5±12.3	12.9±1.2	119.6±9.5
White (B)	11.6±0.3	47.2± 1.2	8.8±0.3	32.8± 1.0	10.2±0.2	41.1±0.8
Ratio of (A) to (B)	1.1	2.8	1.5	3.1	1.3	2.9

The standardized rates of first admissions were 119.6 ± 9.5 and 41.1 ± 0.8 for negroes and whites, respectively, a ratio of 2.9 to 1, a disparity considerably greater than that indicated by the crude rates. Among males the standardized rates were 131.9 ± 14.2 and 47.2 ± 1.2 for negroes and whites, respectively, the former being in excess in the ratio of 2.8 to 1. Among females, the rates were 101.5 ± 12.3 and 32.8 ± 1.0 for negroes and whites, respectively, a ratio of 3.1 to 1.

It is interesting also to compare the relative prevalence of psychoses with cerebral arteriosclerosis with senile psychoses on the basis of

standardized rates of first admission. Among negroes the rate of first admissions with psychoses with cerebral arteriosclerosis exceeded that for the senile psychoses in the ratio of 2.3 to 1. Among whites the corresponding ratio was 1.5 to 1. The relative excess was much greater among males, among whom the ratios of the two rates were 3.7 to 1 and 2.0 to 1 among negroes and whites, respectively. Among females, the corresponding ratios were only 1.8 to 1 and 1.2 to 1 for negroes and whites, respectively.

GENERAL PARALYSIS

It is well-known that there is an excessive prevalence of syphilitic disorders among negroes. One important consequence is the high rate of general paralysis among them. During the three years ended June 30, 1931 there were 306 negro first admissions with general paralysis, of whom 218 were males and 88 females. The average annual rate of first admissions was 25.0 ± 1.7 per 100,000 population. Males and females had first admission rates of 36.9 ± 2.9 and 13.9 ± 1.7, respectively. Among the white population of the State of New York there were 2,524 first admissions with general paralysis in the same period, an average annual first admission rate of 7.0 ± 0.2 per 100,000 population. The negro rate was therefore in excess in the ratio of 3.6 to 1. Males and females in the white population had first admission rates of 11.1 ± 0.3 and 2.8 ± 0.1, respectively. The corresponding negro rates were in excess in the ratios of 3.3 to 1 and 5.0 to 1, respectively.

The age distribution of the negro first admissions with general paralysis is shown in Table 12, together with rates of first admission.

At 15 to 19 years there was an average annual rate of first admission of 2.5 per 100,000 general negro population. The rate rose steadily to a maximum of 93.5 at 55 to 59 years and then declined. Males showed a similar trend, the rate rising from 2.8 at 15 to 19 years to 147.9 at 55 to 59 years, and then decreasing to 48.5 at 65 to 69 years. Owing to the small total admissions among the females the rates fluctuated irregularly after 50 years. Prior to that period, however, the rate grew from a minimum of 2.2 at 15 to 19 years to 39.8 at 45 to 49 years.

Corresponding rates for the white population are shown in Table 13.

Owing to the greater number of first admissions the rates among the whites are more stable than those of the negroes, and the trends are

TABLE 12

Ages of Negro First Admissions With General Paralysis to All Institutions for Patients With Mental Disease in the State of New York During the Fiscal Years 1929 to 1931, Inclusive, and Average Annual Rates of First Admissions per 100,000 General Negro Population

AGE (*Years*)	NUMBER OF FIRST ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 GENERAL POPULATION		
	Males	Females	Total	Males	Females	Total
15-19	1	1	2	2.8	2.2	2.5
20-24	5	2	7	8.0	2.5	4.9
25-29	12	9	21	14.5	9.8	12.0
30-34	25	10	35	33.8	13.6	23.8
35-39	39	20	59	57.4	30.2	43.9
40-44	38	13	51	79.5	28.3	54.4
45-49	39	14	53	106.9	39.8	73.9
50-54	28	6	34	118.9	26.6	73.8
55-59	19	5	24	147.9	39.0	93.5
60-64	5	2	7	66.9	23.9	44.2
65-69	2	4	6	48.5	68.4	60.2
70 and over	4	2	6	89.5	29.5	53.3
Unknown	1	..	1	...	...	...
Total	218	88	306	36.9	13.9	25.0

clear-cut. There was a minimum rate of 0.4 per 100,000 population at 15 to 19 years. The rate rose steadily to a maximum of 18.9 at 40 to 44 years and then declined without interruption to a minimum of 2.3 at 70 years and over. Males and females showed similar trends. Among the former there was a minimum of 0.4 at 15 to 19 years, a maximum of 29.3 at 40 to 44 and a subsequent decline to a rate of 4.2 at 70 years and over. The rates among the females were at a lower level, reaching a maximum of 7.5 at 40 to 44 years, and declining thereafter to 0.7 at 70 years and over.

TABLE 13

Average Annual Rates of First Admissions With General Paralysis to All Institutions for Patients With Mental Disease in the State of New York, by Age Groups, per 100,000 Corresponding General Population, During the Fiscal Years 1929 to 1931, Inclusive, With Ratios of the Corresponding Rates

AGE (*Years*)	AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG NEGROES			AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE WHITE POPULATION			RATIO OF RATE OF FIRST ADMISSIONS AMONG NEGROES TO THAT OF THE WHITE POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
15-19.....	2.8	2.2	2.5	0.4	0.4	0.4	7.0	5.5	6.3
20-24.....	8.0	2.5	4.9	1.0	0.7	0.8	8.0	3.6	6.1
25-29.....	14.5	9.8	12.0	4.5	2.0	3.3	3.2	4.9	3.6
30-34.....	33.8	13.6	23.8	14.2	3.7	9.0	2.4	3.7	2.6
35-39.....	57.4	30.2	43.9	24.2	6.4	15.5	2.4	4.7	2.8
40-44.....	79.5	28.3	54.4	29.3	7.5	18.9	2.7	3.8	2.9
45-49.....	106.9	39.8	73.9	29.0	6.8	18.2	3.7	5.9	4.1
50-54.....	118.9	26.6	73.8	27.2	5.5	16.5	4.4	4.8	4.5
55-59.....	147.9	39.0	93.5	20.7	5.2	12.9	7.1	7.5	7.2
60-64.....	66.9	23.9	44.2	17.1	3.5	10.1	3.9	6.8	4.4
65-69.....	48.5	68.4	60.2	11.5	2.5	6.8	4.2	27.4	8.9
70 and over	89.5	29.5	53.3	4.2	0.7	2.3	21.3	42.1	23.2

The ratios of the negro and white rates at corresponding ages are also shown in Table 13. There appears to be a tendency, especially among the males, for the ratios to decrease through the third decade, and to increase thereafter, through the fifth decade. The female ratio is constantly in excess of the male ratio beginning with the interval 25 to 29 years.

Taking into consideration the age differences between the two populations, standardized rates of first admission are shown in Table 14. The standard population was taken as that of the general population of the State of New York, aged 15 years and over as shown by the Federal census of April 1, 1930.

TABLE 14

Average Annual Rates of First Admissions with General Paralysis, to All Institutions for Mental Disease in the State of New York, Among Negroes and Whites During the Three Fiscal Years Ended June 30, 1931

	MALES		FEMALES		TOTAL	
	Crude	Standardized	Crude	Standardized	Crude	Standardized
Negro (A) ...	36.9±2.9	54.8±4.0	13.9±1.7	21.2±2.4	25.0±1.7	37.9±2.3
White (B)	11.1±0.3	14.9±0.4	2.8±0.1	3.8±0.2	7.0±0.2	9.3±0.2
Ratio of (A) to (B)	3.3	3.7	5.0	5.6	3.6	4.1

Negroes and whites had standardized rates of first admissions of 37.9 ± 2.3 and 9.3 ± 0.2 per 100,000 population, respectively, the former being in excess in the ratio of 4.1 to 1, compared with a ratio of 3.6 to 1 on the basis of 'crude' rates. Among males the corresponding rates were 54.8 ± 4.0 and 14.9 ± 0.4, a ratio of 3.7 to 1. Female negroes had a rate of 21.2 ± 2.4, compared with a rate of 3.8 ± 0.2 among white females, a ratio of 5.6 to 1.

PSYCHOSES WITH CEREBRAL SYPHILIS

In close relation to general paralysis, we may consider psychoses associated with cerebral syphilis. Among negroes there were 60 such first admissions in the three years included in this study, of whom 36 were males and 24, females. The average annual rate of first admissions was 4.9 ± 0.7 per 100,000 population. Males and females had corresponding rates of 6.1 ± 1.2 and 3.8 ± 0.9. Standardized rates for the negroes, together with both crude and standardized rates for the white population are shown in Table 15. The standard population is the same as in the case of general paralysis.

Negroes had a standardized rate of first admission of 7.6 ± 1.0 per 100,000 population, compared with a rate of 0.9 ± 0.1 among whites, a ratio of 8.4 to 1, an appreciable increase over the ratio of 7.0 to 1

TABLE 15

Average Annual Rates of First Admissions with Cerebral Syphilis, to All Institutions for Mental Disease in the State of New York, Among Negroes and Whites During the Three Fiscal Years Ended June 30, 1931

	MALES		FEMALES		TOTAL	
	Crude	Standardized	Crude	Standardized	Crude	Standardized
Negro (A) ...	6.1±1.2	10.2±1.7	3.8±0.9	5.1±1.2	4.9±0.7	7.6±1.0
White (B)	1.0±0.1	1.3±0.1	0.4±0.1	0.5±0.1	0.7±0.1	0.9±0.1
Ratio of (A) to (B)	6.1	7.8	9.5	10.2	7.0	8.4

provided by the crude rates. Among males the standardized rates were 10.2 ± 1.7 and 1.3 ± 0.1 for negroes and whites, respectively, a ratio of 7.8 to 1. Among females the standardized rate of 5.1 ± 1.2 among negroes exceeded that of 0.5 ± 0.1 among whites in the ratio of 10.2 to 1.

The high first admission rates among negroes for both general paralysis and psychoses with cerebral syphilis, and their great relative excesses over the corresponding rates among whites, are eloquent indications of the necessity of the control of syphilis among the former. Control of syphilis is essentially a problem of the restriction of illicit sex behavior. Without minimizing the difficulties of this aspect of social control, one may yet feel that there is room for a program of prevention. For with facilities for prompt diagnosis and with known therapeutic procedures, there is no need for syphilitic infections to grow to a stage resulting in mental and nervous breakdown.

ALCOHOLIC PSYCHOSES

During the three years ended June 30, 1931, there were 184 first admissions with alcoholic psychoses among negroes, of whom 133 were males and 51, females. The average annual rate of first admission was 15.1 ± 1.3 per 100,000 population. Males and females had corresponding rates of 22.5 ± 2.3 and 8.1 ± 1.3, respectively. Among the white

population there were 1,572 first admissions with alcoholic psychoses of whom 1,336 were males and 236 females. The average annual rate of first admissions among whites was 4.3 ± 0.1; the negro rate exceeded this in the ratio of 3.5 to 1. White males and females had average annual rates of 7.3 ± 0.2 and 1.3 ± 0.1, respectively. Compared to these the corresponding negro rates were in excess in the ratios of 3.1 to 1 and 6.2 to 1 respectively.

The age distribution of the negro first admissions, together with corresponding rates of first admission, are shown in Table 16.

TABLE 16

Ages of Negro First Admissions with Alcoholic Psychoses to All Institutions for Patients with Mental Disease in the State of New York During the Fiscal Years 1929 to 1931, Inclusive, and Average Annual Rates of First Admissions Per 100,000 General Negro Population

AGE (*Years*)	NUMBER OF ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 ANNUAL ADMISSIONS		
	Males	Females	Total	Males	Females	Total
20-24	5	4	9	8.0	5.0	6.3
25-29	15	5	20	18.1	5.4	11.4
30-34	22	9	31	29.8	12.3	21.0
35-39	24	15	39	35.3	22.6	29.1
40-44	21	8	29	43.9	17.4	30.9
45-49	27	4	31	74.0	11.4	43.2
50-54	8	4	12	34.0	17.8	26.0
55-59	4	2	6	31.1	15.6	23.4
60 and over	6	..	6	37.3	...	16.2
Unknown	1	..	1	...	...	...
Total	133	51	184	22.5	8.1	15.1

At 20 to 24 years there was an average annual rate of 6.3 per 100,000 population. The rate increased steadily to 43.2 at 45 to 49 years, and then decreased to 16.2 at 60 years and over. Among males the rate increased from 8.0 at 20 to 24 years to 74.0 at 45 to 49 years. The rate

decreased thereafter. The female rates were much lower than those of the males. They rose from a minimum of 5.0 at 20 to 24 years to a maximum of 22.6 at 35 to 39 years.

Corresponding rates for the white population are shown in Table 17.

TABLE 17

Average Annual Rates of First Admissions with Alcoholic Psychoses to All Institutions for Patients With Mental Disease in the State of New York, by Age Groups, per 100,000 Corresponding General Population, During the Fiscal Years 1929 to 1931, Inclusive, With Ratios of the Corresponding Rates

AGE (*Years*)	AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE NEGRO POPULATION			AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE WHITE POPULATION			RATIO OF RATE OF FIRST ADMISSIONS AMONG NEGROES TO THAT OF THE WHITE POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
20-24	8.0	5.0	6.3	1.1	0.2	0.7	7.3	25.0	9.0
25-29	18.1	5.4	11.4	4.0	0.5	2.2	4.5	10.8	5.2
30-34	29.8	12.3	21.0	9.1	1.2	5.1	3.3	10.3	4.1
35-39	35.3	22.6	29.1	12.8	2.1	7.6	2.8	10.8	3.8
40-44	43.9	17.4	30.9	17.4	4.5	11.2	2.5	3.9	2.8
45-49	74.0	11.4	43.2	19.3	4.2	12.0	3.8	2.7	3.6
50-54	34.0	17.8	26.0	17.3	3.0	10.3	2.0	5.9	2.5
55-59	31.1	15.6	23.4	19.1	3.1	11.1	1.6	5.0	2.1
60 and over	37.3	...	16.2	9.4	1.2	5.1	4.0	..	3.2

The general trend is similar to that among negroes. There was an increase from a rate of 0.7 at 20 to 24 years to a maximum of 12.0 at 45 to 49 years, and a decrease thereafter to a rate of 5.1 at 60 years and over. Among males the rate rose from 1.1 at 20 to 24 years to 19.3 at 45 to 49. Among females there was a steady growth to a maximum of 4.5 at 40 to 44 years and a subsequent decline to a rate of 1.2 at 60 years and over.

The ratios of the corresponding rates among negroes and whites are also shown in Table 17. There is a generally downward trend in the ratios, beginning with maxima at the younger age levels. It is also important to note that the female ratio is generally markedly in excess of the male ratio. In other words, as in the case of the syphilitic disorders there is an excessive tainting with alcoholic psychoses among negro females in comparison with corresponding results for white females.

Standardized rates for the two populations are shown in Table 18. The population used as standard is that of the State of New York aged 20 years and over, as shown by the Federal census of April 1, 1930.

TABLE 18

Average Annual Rates of First Admissions with Alcoholic Psychoses, to All Institutions For Mental Disease in the State of New York, Among Negroes and Whites During the Three Fiscal Years Ended June 30, 1931

	MALES		FEMALES		TOTAL	
	Crude	Standardized	Crude	Standardized	Crude	Standardized
Negro (A) ...	22.5±2.3	33.3±3.3	8.1±1.3	11.4±1.9	15.1±1.3	22.2±1.9
White (B) ...	7.3±0.2	11.1±0.4	1.3±0.1	2.0±0.2	4.3±0.1	6.5±0.2
Ratio of (A) to (B)	3.1	3.0	6.2	5.7	3.5	3.4

Negroes had a standardized rate of first admissions of 22.2 ± 1.9 per 100,000 population, compared with a rate of 6.5 ± 0.2 among the whites. The two rates are in the ratio of 3.4 to 1. Adjustment for age differences thus reduced slightly the relative excess of the negro rate. Among males the standardized rates were 33.3 ± 3.3 and 11.1 ± 0.4 for negroes and whites, respectively, a ratio of 3.0 to 1. Among females the negro rate exceeded the white rate in the ratio of 5.7 to 1, the corresponding standardized rates being 11.4 ± 1.9 and 2.0 ± 0.2, respectively.

These statistical results clearly indicate that alcoholism as a social problem among negroes is second only to syphilis. There is urgent need for the control of the evil, but proper action is evidently linked up with a complete program for the improvement of social and living conditions among negroes.

MANIC-DEPRESSIVE PSYCHOSES

During the three years ended June 30, 1931, there were 213 negro first admissions with manic-depressive psychoses. Of these 77 were males and 136, females. The average annual rate of first admission was 17.4 ± 1.4, per 100,000 population. Males and females among negroes had corresponding rates of 13.0 ± 1.7 and 21.5 ± 2.2, respectively. During the same period there were 3,621 first admissions with manic-depressive psychoses among the white population of the State of New

TABLE 19

Ages of Negro First Admissions With Manic-Depressive Psychoses to All Institutions for Patients With Mental Disease in the State of New York During the Fiscal Years 1929 to 1931, Inclusive, and Average Annual Rates of First Admissions Per 100,000 General Negro Population

AGE (*Years*)	NUMBER OF ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 GENERAL POPULATION		
	Males	Females	Total	Males	Females	Total
10-14	1	2	3	2.8	5.3	4.1
15-19	8	18	26	22.5	39.3	32.0
20-24	15	25	40	24.1	31.3	28.1
25-29	13	24	37	15.7	26.1	21.2
30-34	9	21	30	12.2	28.6	20.4
35-39	14	20	34	20.6	30.2	25.3
40-44	6	15	21	12.6	32.6	22.4
45-49	5	8	13	14.0	22.7	18.1
50-54	3	3	6	12.7	13.3	13.0
55 and over	3	..	3	10.4	...	4.8
Total	77	136	213	13.0	21.5	17.4

York, of whom 1,441 were males and 2,180, females. The average annual rate of first admissions among the white population was 10.0 ± 0.2, per 100,000 population. The negro rate was therefore in excess in the ratio of 1.7 to 1. White males and white females had average annual rates of 7.9 ± 0.2 and 12.1 ± 0.3, respectively. These were exceeded by the corresponding negro rates in the ratios of 1.6 to 1 and 1.8 to 1, respectively.

The age distribution of the negro first admissions, together with corresponding rates of first admission are shown in Table 19.

The rates are unusually low at 10 to 14 years, but they probably are accidental fluctuations. At 15 to 19 years there was a rate of 32.0 per 100,000 population. This was followed, on the whole, by a declining trend. Among negro males the rates fluctuated somewhat irregularly.

TABLE 20

Average Annual Rates of First Admissions with Manic-Depressive Psychoses to All Institutions for Patients With Mental Disease in the State of New York, by Age Groups, Per 100,000 Corresponding General Population, During the Fiscal Years 1929 to 1931, Inclusive, with Ratios of the Corresponding Rates

AGE (*Years*)	AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE NEGRO POPULATION			AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE WHITE POPULATION			RATIO OF RATE OF FIRST ADMISSIONS AMONG NEGROES TO THAT OF THE WHITE POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
15-19	22.5	39.3	32.0	6.3	10.2	8.3	3.6	3.9	3.9
20-24	24.1	31.3	28.1	13.1	16.9	15.1	1.8	1.9	1.9
25-29	15.7	26.1	21.2	9.5	19.6	14.6	1.7	1.3	1.5
30-34	12.2	28.6	20.4	10.3	20.6	15.5	1.2	1.4	1.3
35-39	20.6	30.2	25.3	11.4	20.9	16.0	1.8	1.4	1.6
40-44	12.6	32.6	22.4	12.6	19.6	16.0	1.0	1.7	1.4
45-49	14.0	22.7	18.1	11.9	17.3	14.5	1.2	1.3	1.2
50-54	12.7	13.3	13.0	14.9	17.4	16.2	0.9	0.8	0.8
55 and over	10.4	...	4.8	8.4	7.8	8.1	1.2	..	0.6

Among females there was a downward trend between 15 to 19 years and 25 to 29 years inclusive, followed by a rising trend through 40 to 44 years. Thereafter the rates declined.

Corresponding rates are shown for the white population in Table 20.

The rates fluctuate unevenly among the males, though there is on the whole, a rising trend between the intervals 25 to 29 years and 50 to 54 years, inclusive. Among females the rates are more stable, and there is a rising trend from 15 to 19 years to 35 to 39 years, inclusive, followed by a downward trend culminating in a minimum at 55 years and over. As among the negroes, the females show higher rates of first admission than males.

The negro rates are compared with the white rates at corresponding ages in Table 20. From 10 to 14 years to 45 to 49 years inclusive, the negro rates are in excess of the white rates, though the excess appears to decline with advancing age. After 50 years, however, the white rate exceeds that of the negroes.

Standardized rates of first admission are shown in Table 21. The standard population is that of the State of New York aged 15 years and over on April 1, 1930.

TABLE 21

Average Annual Rates of First Admissions with Manic-Depressive Psychoses, to All Institutions for Mental Disease in the State of New York, Among Negroes and Whites During the Three Fiscal Years Ended June 30, 1931

	MALES		FEMALES		TOTAL	
	Crude	Standardized	Crude	Standardized	Crude	Standardized
Negro (A) ...	13.0±1.7	16.0±2.2	21.5±2.2	24.1±2.6	17.4±1.4	20.0±1.7
White (B) ...	7.9±0.2	10.6±0.3	12.1±0.3	16.3±0.4	10.0±0.2	13.3±0.3
Ratio of (A) to (B)	1.6	1.5	1.8	1.5	1.7	1.5

Negroes had a standardized rate of 20.0 ± 1.7 per 100,000 population, compared with a rate of 13.3 ± 0.3 among the white population. These provide a ratio of 1.5 to 1, slightly less than that based upon the crude rates. Among males the standardized rates were 16.0 ± 2.2 and 10.6 ± 0.3 for negroes and whites, respectively, a ratio of 1.5 to 1. Among females the rates were 24.1 ± 2.6 and 16.3 ± 0.4 for negroes and whites, respectively, a ratio of 1.5 to 1.

DEMENTIA PRAECOX

Among the negroes there were 543 first admissions with dementia praecox during the three years ended June 30, 1931, of whom 277 were males and 266 females. The average annual rate of first admissions was 44.4 ± 2.2 per 100,000 population. In the white population there were 6,962 first admissions with dementia praecox, of whom 3,855 were

TABLE 22

Ages of Negro First Admissions with Dementia Praecox to All Institutions for Patients with Mental Disease in the State of New York During the Fiscal Years 1929 to 1931, Inclusive, and Average Annual Rates of First Admissions Per 100,000 General Negro Population

AGE (*Years*)	NUMBER OF ADMISSIONS			AVERAGE ANNUAL RATE PER 100,000 POPULATION		
	Males	Females	Total	Males	Females	Total
10-14	2	..	2	5.7	...	2.7
15-19	17	14	31	47.9	30.5	38.1
20-24	59	33	92	94.7	41.3	64.7
25-29	67	49	116	80.8	53.2	66.3
30-34	44	58	102	59.5	79.1	69.2
35-39	39	38	77	57.4	57.3	57.4
40-44	25	31	56	52.3	67.4	59.7
45-49	11	24	35	30.2	68.2	48.8
50-54	7	9	16	29.7	40.0	34.7
55 and over	5	10	15	17.3	29.6	23.9
Unknown	1	..	1	...	...	...
Total	277	266	543	46.9	42.1	44.4

males and 3,107, females. The average annual rate of first admission was 19.2 ± 0.3. The negro rate was therefore in excess in the ratio of 2.3 to 1. Males and females among the white population had rates of 21.2 ± 0.4 and 17.2 ± 0.4, respectively; the corresponding negro rates were in excess in the ratio of 2.2 to 1 and 2.4 to 1, respectively.

The age distribution of the negro first admissions with dementia praecox, together with rates of first admission, are shown in Table 22.

The rate rose gradually to a maximum of 69.2 per 100,000 population at 30 to 34 years and declined thereafter to a rate of 23.9 at 55 years and over. Among males the rate grew rapidly to a maximum of 94.7 at 20 to 24 years, and then declined steadily to a minimum of 17.3 at 55 years and over. The female rate reached a maximum of 79.1

TABLE 23

Average Annual Rates of First Admissions with Dementia Praecox to All Institutions for Patients With Mental Disease in the State of New York, by Age Groups, Per 100,000 Corresponding General Population, During the Fiscal Years 1929 to 1931, Inclusive, with Ratios of the Corresponding Rates

AGE (*Years*)	AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE NEGRO POPULATION			AVERAGE ANNUAL RATE OF FIRST ADMISSIONS AMONG THE WHITE POPULATION			RATIO OF RATE OF FIRST ADMISSIONS AMONG NEGROES TO THAT OF THE WHITE POPULATION		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
15-19	47.9	30.5	38.1	24.2	10.6	17.3	2.0	2.9	2.2
20-24	94.7	41.3	64.7	50.3	22.1	35.8	1.9	1.9	1.8
25-29	80.8	53.2	66.3	48.7	27.2	37.8	1.7	2.0	1.8
30-34	59.5	79.1	69.2	37.3	31.7	34.5	1.6	2.5	2.0
35-39	57.4	57.3	57.4	34.9	33.5	34.2	1.6	1.7	1.7
40-44	52.3	67.4	59.7	23.4	31.8	27.4	2.2	2.1	2.2
45-49	30.2	68.2	48.8	18.8	25.9	22.3	1.6	2.6	2.2
50-54	29.7	40.0	34.7	14.5	24.1	19.2	2.0	1.7	1.8
55 and over	17.3	29.6	23.9	4.8	9.0	6.9	3.6	3.3	3.5

at 30 to 34 years, and then declined to a minimum of 29.6 at 55 years and over. It should be noted that under 30 years of age the male rate exceeded that of the females, thereafter the female rate was in excess with one minor exception.

Corresponding rates for the white population are shown in Table 23.

The general trends were similar to those among negroes. The rate rose to a maximum of 37.8 at 25 to 29 years and then declined steadily to a minimum of 6.9 at 55 years and over. Males and females showed similar trends, but among the former a maximum rate of 50.3 was reached at 20 to 24 years, whereas among females the maximum of 33.5 was not reached until the interval 35 to 39 years. The male rates were in excess of those of the females up to 35 to 39 years, inclusive.

Negro and white ratios of rates of first admissions at corresponding ages are shown in Table 23.

The negro rate exceeds that of the whites in every interval. There appears to be a tendency for the ratio to decrease between the younger age levels and the thirties, and to increase thereafter. This is particularly evident among the males.

Standardized rates of first admission for dementia praecox are shown in Table 24. The standard population is that of the State of New York, aged 15 years and over on April 1, 1930.

TABLE 24

Average Annual Rates of First Admissions with Dementia Praecox, to All Institutions for Mental Disease in the State of New York, among Negroes and Whites During the Three Fiscal Years Ended June 30, 1931

	MALES		FEMALES		TOTAL	
	Crude	Standardized	Crude	Standardized	Crude	Standardized
Negro (A) ...	46.9±3.3	52.3±3.9	42.1±3.0	50.1±3.7	44.4±2.2	51.1±2.7
White (B) ...	21.2±0.4	28.5±0.5	17.2±0.4	23.2±0.5	19.2±0.3	25.7±0.4
Ratio of (A) to (B)	2.2	1.8	2.4	2.2	2.3	2.0

Negroes had a standardized rate of 51.1 ± 2.7 per 100,000 population, compared with a rate of 25.7 ± 0.4 among the white population, a ratio of 2.0 to 1. Standardization therefore reduced the negro excess in comparison with the ratio based upon crude rates. Among males, the rates were 52.3 ± 3.9 and 28.5 ± 0.5 for negroes and whites, respectively, a ratio of 1.8 to 1. Negro females, with a rate of 50.1 ± 3.7, exceeded the corresponding rate among white females in the ratio of 2.2 to 1.

RATES OF MENTAL DISEASE IN THE NEGRO AND WHITE POPULATIONS OF NEW YORK CITY

In addition to the age factor, it is necessary to consider the effect of environmental differences upon rates of mental disease. One important difference arises from the uneven distribution of whites and negroes throughout the State of New York. Of the 12,150,293 whites enumerated on April 1, 1930, 6,587,225, or 54.2 per cent, were in New York City. Among the 412,814 negroes, on the other hand, 327,706, or 79.4 per cent, lived in New York City. Furthermore 94.6 per cent of the negro population lived in urban areas, compared with only 83.2 per cent of the whites. As it is known that rates of mental disease are higher in urban than in rural areas, and in particular are higher in New York City than in up-State New York, it is advisable to limit the comparison as far as possible to similar environments. Of course, size of population, or even density of population, is not the sole environmental influence. No one believes that the social and economic environments in the negro sections of New York City are similar to those of the white population. But in the present stage of demographic statistics, it is impossible to refine the rates with respect to the more subtle environmental influences. Limitation of the analysis to New York City is an approach, although an admittedly inadequate one, to the statistical control of environmental factors.

During the three years ended June 30, 1931, there were 1,463 negro first admissions, and 14,737 white first admissions from New York City to institutions for mental disease. These are classified according to psychoses in Table 25.

There are no essential differences in the relative distribution of psychoses among the negro first admissions from New York City and those for all negroes, but this is due to the influence of the great mass of

negroes from the metropolitan area. The white population of New York City, on the other hand, has slightly higher average rates of first admissions than has the white population of the entire State.

Standardized rates for both negroes and whites in New York City are summarized in Table 26. The standard populations are the same as those employed in obtaining corresponding standardized rates for the entire State. These rates may be compared directly with the corresponding standardized rates for the State of New York.

The standardized rates of first admission for the negro and white populations of New York City were 233.3 ± 6.5 and 104.3 ± 1.0, respectively. Both indicate increases in comparison with the corresponding rates for the entire State, though in the case of the negroes the difference is not statistically significant. The ratio of the negro rate to that of the white population of New York City was 2.2 to 1, compared with a ratio of 2.3 to 1 for the entire State. The reduction results from a relative decrease in the female ratio.

The standardized rates of first admission among the negro population of New York City exceed those of the negro population of the State in psychoses with cerebral arteriosclerosis, and general paralysis. They are practically equivalent in the alcoholic psychoses, manic-depressive psychoses, and dementia praecox. The New York City rate is lower in the senile psychoses, and in those with cerebral syphilis. The differences, however, cannot be considered statistically reliable.

The white population of New York City has standardized rates in excess of those of the white population of the entire State in the senile psychoses, psychoses with cerebral arteriosclerosis, general paralysis, and dementia praecox. The rates are practically equivalent in psychoses with cerebral syphilis, alcoholic psychoses and manic-depressive psychoses.

Comparing the negro rates with those of the white population of New York City, we find that the former exceeds the latter in the senile psychoses in the ratio of 1.4 to 1, a marked reduction from the ratio of 1.9 to 1 for the entire State. The reduction is especially marked among the females. In psychoses with cerebral arteriosclerosis there was a ratio of 2.8 to 1, slightly less than the corresponding ratio for the entire State. The syphilitic disorders are much more prevalent among the negroes of New York City, though the ratios of the negro and white populations are less than those for the State of New York as a whole. In the alcoholic psychoses there was a slight relative increase in the

TABLE 25

First Admissions from New York City to All Institutions for Mental Disease in the State of New York, During the Fiscal Years 1929 to 1931, Inclusive, Classified by Race and Psychoses

PSYCHOSES	NEGRO			WHITE		
	Number of first admissions	Per cent of total	Average annual rate per 100,000 population	Number of first admissions	Per cent of total	Average annual rate per 100,000 population
Traumatic	18	1.2	1.9	194	1.3	1.0
Senile	32	2.2	3.3	1,086	7.4	5.5
With cerebral arteriosclerosis	139	9.5	14.3	2,048	13.9	10.4
General paralysis	239	16.3	24.6	1,480	10.0	7.5
With cerebral syphilis	42	2.9	4.3	127	0.9	0.7
With Huntington's chorea	....	....	....	13	0.1	0.1
With brain tumor	....	....	....	20	0.1	0.1
With other brain or nervous diseases	13	0.9	1.3	222	1.5	1.1
Alcoholic	146	10.0	15.1	834	5.7	4.3
Due to drugs and other exogenous toxins	9	0.6	0.9	44	0.3	0.2

With pellagra	....	....	....	1	*	**
With other somatic diseases	30	2.1	3.1	264	1.8	1.3
Manic-depressive	176	12.0	18.1	2,068	14.0	10.5
Involution melancholia	4	0.3	0.4	305	2.1	1.6
Dementia praecox	440	30.1	45.4	4,391	29.8	22.4
Paranoia or paranoic conditions	2	0.1	0.2	131	0.9	0.7
Epileptic psychoses	34	2.3	3.5	275	1.9	1.4
Psychoneuroses and neuroses	....	....	....	159	1.1	0.8
With psychopathic personality	36	2.5	3.7	383	2.6	2.0
With mental deficiency	54	3.7	5.6	385	2.6	2.0
Undiagnosed psychoses	45	3.1	4.6	217	1.5	1.1
Without psychosis	4	0.3	0.4	90	0.6	0.4
Total	1,463	100.0	150.8	14,737	100.0	75.1

*Less than 0.05 per cent.
**Less than 0.05 per 100,000 population.

ratio, due to an increase in the male negro rate. The ratios in the manic-depressive psychoses were practically equivalent in the State and in New York City, but in dementia praecox the ratio in New York City was less than that for the State.

From these results it is evident that negroes have higher rates of mental disease than the white population, and that the excess is not due to age differences, nor to gross environmental differences, such as those between urban and rural dwellers.

In connection with several of the preceding groups of psychoses, such as general paralysis and alcoholic psychoses, it is possible to offer explanations of the high rates of first admissions among negroes in terms of environmental factors. The presence of syphilis among negroes is often attributed to excesses arising from a supposedly more powerful sex urge among them. But it is difficult to accept such a biological explanation of general paralysis, especially since the disease is so seldom reported among primitive negroes. It is far more reasonable to suppose that the sexual laxity which exists among great sections of American negroes is due in great part to their history rather than to their nature. This is clearly recognized by negroes themselves, and is well expressed in the following passage:

> It is true that much of the moral laxity which exists among us today arose out of slavery. It is due to a system which whipped women, which dispensed with the institution of marriage, which separated wives from their husbands and assigned them to other men, which ruthlessly destroyed female virtue, and which made helpless women the abject tools of their masters. This is the correct explanation of our social status today, but to explain it is not to excuse it. (7)

Undoubtedly the social forces set loose by such a system exist to-day in the form of a cultural lag, even though the original circumstances have altered. Living as urban negroes usually do, either in or on the outskirts of undesirable neighborhoods, there can be little doubt that their high rates of first admission with respect to general paralysis and alcoholic psychoses can be related, in large part, to deleterious social surroundings.

It is difficult, however, to explain dementia praecox and the manic-depressive psychoses in terms of purely environmental factors, though it is sometimes asserted that the change from the warm climate of the south to the rigorous winter of the north does facilitate a mental breakdown. There probably is a less stable, more emotional make-up among

TABLE 26

Average Annual Rate of First Admissions among Negroes and Whites from New York City to All Institutions for Mental Disease in the State of New York, Fiscal Years 1929-1931, Inclusive*

	NEGRO			WHITE			RATIO OF RATE AMONG NEGROES TO THAT AMONG WHITES		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
All first admissions	263.2	199.4	233.3	114.9	91.7	104.3	2.3	2.2	2.2
With senile psychoses	32.1	50.0	45.9	24.3	34.1	32.3	1.3	1.5	1.4
With cerebral arteriosclerosis	171.9	121.6	150.8	59.7	44.0	53.4	2.9	2.8	2.8
General paralysis	58.5	20.1	39.1	16.5	3.8	10.1	3.5	5.3	3.9
With cerebral syphilis	7.2	4.8	5.9	1.1	0.7	0.9	6.5	6.9	6.6
Alcoholic	34.5	11.2	22.7	10.8	2.4	6.5	3.2	4.7	3.5
Manic-depressive	14.5	26.6	20.5	10.4	17.0	13.6	1.4	1.6	1.5
Dementia praecox	50.8	51.4	50.8	31.5	26.0	28.5	1.6	2.0	1.8

*Standardized rates.

negroes than whites. Negro music, as seen in spirituals, blues, and jazz, clearly points to such characteristics. Given such emotional instability, it is likely that there is a fruitful ground for functional mental disorders.

SUMMARY

1. The negro population of the State of New York had an average annual rate of first admissions to all institutions for mental disease of 150.6 per 100,000 negro population during the three fiscal years ended June 30, 1931. This exceeded the corresponding rate among the white population in the ratio of 2.0 to 1.

2. Dementia praecox was the leading psychosis among negroes, accounting for 29.5 per cent of all the first admissions and providing a rate of 44.4 per 100,000 population.

3. General paralysis ranked second among negroes, and fourth among the white population, including 16.6 and 9.4 per cent, respectively of the total first admissions. The rates of first admission were 25.0 for negroes and 7.0 for the white population, a ratio of 3.6 to 1.

4. The manic-depressive psychoses ranked third in frequency among both racial groups, but the negroes had a rate of first admission of 17.4, the whites 10.0, a ratio of 1.7 to 1.

5. The alcoholic psychoses ranked fourth among the negroes, but sixth among the white population. The corresponding rates were 15.1 and 4.3, respectively, a ratio of 3.5 to 1.

6. Psychoses with cerebral syphilis have low rates of first admission, but they are of interest because of the great excess of the negro rate over the white rate.

7. The lowest rates among negroes are found in the psychoneuroses and neuroses, paranoia or paranoic conditions, involution melancholia, psychoses due to drugs, and pellagra.

8. In all the major psychoses, except the senile psychoses, the negro population has higher rates of first admission than the white population. The lower rate in the senile psychoses is due to the favorable age distribution of the negroes. When standardized, negroes have a higher rate than whites.

9. There are sex differences as follows: Negro males have higher rates than negro females in general paralysis, psychoses with cerebral syphilis, and alcoholic psychoses. They also have higher rates of de-

mentia praecox, though the difference is not statistically significant. Negro females have higher rates in the senile psychoses, and manic-depressive psychoses.

10. On the basis of standardized rates of first admission, the greatest discrepancy between negroes and whites is found in psychoses with cerebral syphilis, the negro rate exceeding that of the whites in the ratio of 8.4 to 1. General paralysis followed, the ratio of the corresponding rates being 4.1 to 1. In the alcoholic psychoses, the negro rate is in excess in the ratio of 3.4 to 1. The lowest ratio among the major psychoses occurs in the manic-depressive psychoses, the negro rate being in excess in the ratio of 1.5 to 1. In dementia praecox the corresponding ratio is 2.0 to 1.

11. The ratio of the corresponding rates in the major psychoses is generally greater among females than males. It is especially high in psychoses with cerebral syphilis, the negro female rate exceeding that of the female white population in the ratio of 10.2 to 1. In the alcoholic psychoses and in general paralysis the corresponding ratios are 5.7 to 1 and 5.6 to 1, respectively.

12. The relative order of the rates of first admission is not seriously affected, when they are based upon admissions from New York City.

13. The negro population and the negro insane are younger than the corresponding white populations.

14. Due to their inferior economic status, negroes have a low rate of first admission to private institutions for mental disease.

15. Negroes, however, have much higher rates of first admission to State hospitals for the criminal insane, exceeding the rate of the white population in the ratio of 4.5 to 1.

REFERENCES

(1) POLLOCK, H. M. Mental disease among negroes in the United States. *State Hospital Quarterly*, November, 1925, page 53.

(2) *Ibid*, pages 53-54.

(3) Insane and Feebleminded in Institutions, 1910. *Washington*, Government Printing Office, 1914, page 35.

(4) POLLOCK, *ibid*, page 53.

(5) KIRBY, G. H. A study in race psychopathology. *State Hospitals Bulletin*, New Series, Vol. 1, No. 4, March, 1909, page 669.

(6) The Medical Department of the United States Army in the World War. Volume X. Neuropsychiatry. Page 211.

(7) FISK, EUGENE. *Atlanta University Publications*, No. 2. Page 27.

A STATIONARY POPULATION (A STUDY OF IOWA POPULATION)

BY BERNARD D. KARPINOS

State University of Iowa

THE PROBLEM

IT IS a well-established fact that an excess of births over deaths and a birth-rate relatively high with respect to the death-rate are not altogether indicative of a population's reproductive vitality. In fact, great caution should be exercised in accepting any assertion as to the future rate of a population's increase based on the current birth- and death-rates. These are changing factors affected not only by the fecundity of the women but also by the age-composition of the population. A preponderance of persons in the middle age groups at which fertility rates are high and mortality rates low, will result logically in a large number of births and a high birth-rate[1] and correspondingly a small number of deaths and a low death-rate, though the fecundity in itself of the female population may not be sufficient for the population to maintain itself. The age-composition in such a case is favorable for high and rapid increase, the fertility-deficiency — if there is such — is overwhelmed by the excess in the more potent reproductive ages.

Births and birth-rates are a function not only of fecundity *per se* but also of the age-composition of the population. Birth-rates and death-rates go in such cases hand in hand in enhancing the "crude" natural increase of a population, as measured by the excess of the birth-rate over the death-rate. These age-composition factors that are responsible for such conditions will, however, sooner or later fade out and an opposite trend will start: the birth-rate will drop, the death-rate will rise, and the present increase may turn out to be no increase at all.

[1] Birth-rate shows the number of births (exclusive of still-births) per 1,000 population; death-rate gives the number of deaths per 1,000 population.

A point in question rises: what could be responsible for this so-called preponderance of persons in the middle age-groups of a population? Several sources have been pointed out.

First, immigration that has brought many young people, increased the percentage in the reproductive age-groups. Such a state of affairs has been actual in the United States,[2] and in the state of Iowa from 1840 to 1870. (Compare the age-pyramids of 1880 with that of 1930, Figure 6.)

A second source of the present high percentage of persons in the middle years of life is the high birth-rate of past generations. The fathers and mothers of today are the progeny of generations when large families were the rule. This folkway, however, no longer exists: changes in the reproductive habits of the American population have taken place.[3]

A third source, though a less immediately obvious one, is the recent rapid fall in birth-rates and in the number of births. When the birth-rates are falling the new generations are smaller in number as compared with those of their predecessors, and thus give rise to a higher proportion in the middle age-groups, covering up the inherent trend. But birth-rates cannot continue to decline indefinitely; sooner or later they will become stabilized, as will be shown.

Evidently, this last source of high proportionality in the more reproductive age-groups, with respect to the total population, will eventually also be cut off and, if we assume that no new immigration will take place, we will have a shift in the age-composition of the population. The swollen reproductive age-groups will be the older ages; the population will grow old.

With these sources vanished, the proportion in the reproductive age-groups will decrease; the birth-rate therefore will decline, and the death-rate will rise, even though there will prevail the same present fecundity of women and the same mortality.

---

[2] Louis I. Dublin, and Alfred J. Lotka, "On the True Rate of Natural Increase," *Journal of American Statistical Association*, 20 (1925), 305-307.

[3] Louis I. Dublin, "Birth Control What It Is Doing To American Population," *Forum*, 86 (1931), 270-275.

It was proved by Sharpe and Lotka[4] that with a fixed rate of procreation (maternity frequencies)[5] at every age of life, and with a fixed life curve (life table) the irregularities in the age-composition (providing no immigration or emigration occurs) will eventually be smoothed out and the population will settle at a stable age-distribution. The natural rate of increase will then become constant; it will be the so-called stabilized or standardized rate of increase, its "true" rate. There will be a considerable difference between the prevailing birth- and death-rates and those expected when a population has outgrown the irregularities of its own age-composition. It was shown by Dublin and Lotka[6] in a paper on the true natural increase of the population of the United States that when due allowances have been made for the adjustment of the age-distribution, the adjusted birth-rate of the white population of the United States for 1920 was 20.9 instead of 23.4 and the death-rate 15.4 instead of 12.4 as recorded in the birth statistics. This assumed the same fecundity of women and the same mortality. The birth- and death-rates that prevailed at that time gave a crude natural increase of 11 per thousand per annum (23.4 — 12.4) while the adjusted rates showed an increase of only 5.5 per thousand per annum (20.9 — 15.4), a decline of exactly 50 per cent, as compared with the crude rates.

In a later paper, the same authors, writing on the same subject,[7] revised their figures on the basis of more recent data — in the meantime the fecundity has fallen materially — and proved that when due corrections are made for the departures of the age-distribution, the birth-rate for the white population of the United States for the year 1928 was 17.3 and the death-rate 15.6, as against the reported figures of 19.4 and 11.6 respectively. The true increase was 1.7 per thousand (17.3 — 15.6), as against the observed increase of 7.8 (19.4 — 11.6) making only 22 per cent, approximately, of the crude increase.[8]

---

[4] F. R. Sharpe, and Alfred J. Lotka, "A Problem of Age Distribution," *London, Edinburgh and Dublin Philosophical Magazine and Journal of Science,* 21, Sixth Series, (January-June, 1911), 435-438. See also: Alfred J. Lotka, *Elements of Physical Biology,* Williams and Wilkins Company, 1925, 110-118.

[5] Maternity frequencies, as called by Dublin and Lotka, correspond to the specific fertilities in Kuczynski's terminology (the meaning of the terms will be explained later).

[6] Louis I. Dublin, and Alfred J. Lotka, "On the True Rate of Natural Increase," *Journal of the American Statistical Association,* 20 (1925), 327-329.

[7] Louis I. Dublin, and Alfred J. Lotka, "The True Rate of Natural Increase of the Population of the United States," *Metron,* 8 (1930), 107-119.

[8] These revised data were computed by Dublin and Lotka on the basis of the recent birth-rates; the population, however, was interpolated from the 1920 Census, as the 1930 Census was not published at that time (see: *Metron,* June 15, 1930, p. 110, Table 2). The true rate would be lower were it recalculated on the basis of 1930 data. In fact, it would be only slightly higher than the one computed for Iowa (from a study by the author).

It is with these diagnosed points in mind that this study was undertaken for the population of the state of Iowa, a typical agricultural state in the Midwest of the United States.[9] Its purpose was, broadly speaking, a prognosis of the probable course of Iowa's population. In detail, its objectives were the following: (1) To calculate, on the basis of the latest available birth-statistics, the so-called specific fertility-rates (maternity frequencies), eliminating thus the effects of the "abnormal" age-composition; (2) To find the constant rate at which the population will increase or decrease when it becomes stabilized; namely, when the irregularities of the age-distribution are smoothed out. It is the computation of r as designated by Dublin and Lotka in their studies that we have in mind; (3) To determine the age-composition of the population when stabilized; (4) To discover when this stabilization point will be reached; (5) To follow up the growth of the total population as well as of its separate age-groups; (6) To trace the movements of births and deaths, and birth- and death-rates; (7) To point out the changes that will take place in the age-distribution of the population.

As a starting point for this study, the year 1929 was taken — the latest year for which the necessary data of births classified by age of mother were published. The following assumptions were made: (1) All births and deaths in the state were registered; (2) the enumeration of the population as given by the 1930 Census is complete; (3) the fertility rates as found for 1929 will continue in the future; and (4) no immigration or emigration will occur.

SPECIFIC FERTILITY RATES

It was shown above that the birth-rate is not an adequate measure of a population's vitality. If in a population the percentage of women of child-bearing age is large, it was argued, the birth-rate is likely to be high even if fertilities are low, whereas a population with a smaller percentage of women in the child-bearing age will show a low birth-rate although the fertilities may be large. To correct this misleading

[9] The rural population of this state made up, according to the 1930 Census, above 60 per cent of the entire population. The Census classifies as "rural" those population places that count less than 2,500; from 2,500 and above they are called urban. However, Iowa includes only one city above 100,000, and 9 cities of 25,000 to 100,000, that comprise together a population of 544,000, making up 22 per cent of the population. It seems that, from the sociological point of view, 78 per cent of the population could be called rural.

index, it is essential to compute the so-called fertility rates in Kuczynski's terminology,[10] or maternity frequencies in Dublin and Lotka's terminology, by relating the number of children borne by mothers of a specific age to the total female population of that age. The specific fertility rates are generally computed on a quinquennial basis.

The procedure of calculation is a simple one. The *Birth, Stillbirth and Infant Mortality Statistics,* published by the United States Bureau of the Census, provide a classification of births by age of mother.[11] Thus, in 1929, 8 daughters were born to mothers of the age-group 10-to-14, 2038 daughters to the age-group of 15-to-19 and so on. From the census we find how many females lived at this age-group in that particular year.[12] Each number of births is divided by the female population of its corresponding age-group and the resultant multiplied by 100,000, getting thus the number of females born per 100,000 females of that specific age-group. The specific fertility was found to be 7 for the quinquennial age-group 10-to-14; 1,863 for the age-group 15-to-19 and so on. The highest specific fertilities are those of the age-groups 20-to-29, and that is the reason why changes, however slight, in the per cent compositions of these groups produce noticeable changes in the birth-rate. By this procedure the computation of the fertility-rates is reduced to one basis, and the age-composition factors are thus ruled out.

The total fertility rate for Iowa in 1929 was 110,580, namely 100,000 mothers starting life together are replaced within a generation by 110,580 potential mothers provided none of the present mothers dies before reaching the child bearing age or while passing through that age. But in reality, of the 100,000 females born only 93,817 reach the age of 12.5 and their number is reduced to 93,154 at the age of 17.5, 92,177 at 22.5, etc.[13] Obviously if 100,000 females give birth to 1,863 daughters at the age of 17.5, then the 93,154 females who remain of the 100,000 that started life together, bear 1,735 daughters (1,863 x .93154); the 92,177 females at 22.5 bear 5,249 daughters (5,695 x .92177) and so on.

---

[10] See: Kuczynski, Robert R., *The Balance of Births and Deaths,* Macmillan Company, New York, 1928, pp. 16-39. Also by the same author: *Fertility and Reproduction,* Falcon Press, 1932.

[11] See Table 1.

[12] The female population in Iowa for 1929 was interpolated from the 1930 Census, on an arithmetical basis.

[13] See Table 2, column 3.

TABLE 1*

Quinquennial Fertility Rates of Iowa Population, 1929

1 AGE INTERVAL	2 FEMALE POPULATION IN 1929	3 DAUGHTERS BORN IN 1929	4 = (3:2) MATERNITY FREQUENCY $m(a)$ (DAUGHTERS ONLY) PER 100,000 FEMALES
10-14	114,954	8	7
15-19	109,414	2,038	1,863
20-24	100,086	5,700	5,695
25-29	90,082	5,338	5,926
30-34	86,587	3,842	4,437
35-39	86,193	2,546	2,954
40-44	76,518	847	1,107
45-49	69,038	86	125
50-54	60,582	1	2
		20,406	22,116
			x 5
			110,580

* Column 2 gives the numbers of females at different age-groups for the child-bearing period, namely from 10 to 54, in 1929. These were interpolated on an arithmetic basis from the 1930 Census for 9 months back, as the birth statistics are reported for July (1929), and the 1930 Census was taken in April (1930).

Column 3 shows the number of female births by age of mother. Thus, 8 daughters were born to mothers of the 10-to-14 age-group, or 2,038 to the 15-to-19 group. The data were adopted from *Birth, Stillbirth and Infant Mortality Statistics for 1929*, p. 187. Our data as given in column 3 differ slightly from those given in the Birth Statistics (p. 187) for we distributed among the different groups the 64 unknown female births.

Every number of births of a specific age-group is divided by the total number of females in that age-group, and the resultant multiplied by 100,000. Thus, we find how many daughters are born to 100,000 females of that group. According to the statistics, 5,700 daughters were born to the 20-to-24 group which counted 100,086 females, consequently 5,695 daughters are born per 100,000 females of that group (5,700/100,086 x 100,000).

These are the *specific fertility rates*, as tabulated in column 4. The sum of all the separate specific fertilities makes up the so-called *total fertility*.

TABLE 2

Computation of True Rate of Natural Increase of Iowa Female Population, 1929

AGE INTERVAL	MATERNITY FREQUENCY $m(a)$ (DAUGHTERS ONLY)	SURVIVAL FACTORS AT 12.5, 17.5 ETC.	R_0 ZERO MOMENT $\Sigma m(a)\, l_a$	R_1 FIRST MOMENT $\Sigma a m(a)\, l_a$	R_2 SECOND MOMENT $\Sigma a^2 m(a)\, l_a$
1	2	3	4 = (2 x 3)	5	6
10-14	7	.93817	7	87.5	1,093.7
15-19	1,863	.93154	1,735	30,362.5	531,343.8
20-24	5,695	.92177	5,249	118,102.5	2,657,306.2
25-29	5,926	.90951	5,390	148,225.0	4,076,187.6
30-34	4,437	.89593	3,975	129,187.5	4,198,593.7
35-39	2,954	.88076	2,602	97,575.0	3,659,062.6
40-44	1,107	.86160	954	40,545.0	1,723,162.5
45-49	125	.83713	105	4,987.5	236,906.3
50-54	2	.80325	2	105.0	5,512.5
	22,116		20,019	569,177.5	17,089,169.0
	x 5		x 5	x 5	x 5
	110,580		100,095 R_0	2,845,887.5 R_1	85,445,845.0 R_2

Data:

$$a = \frac{R_1}{R_0} = 28.43;\ a^2 = 808.26$$

$$\beta = a^2 - \frac{R_2}{R_0} = 808.26 - 853.65 = -45.39$$

$$\log_e R_0 = 0.000951889$$

The equation: $\frac{1}{2}\beta r^2 + ar - \log_e R_0 = 0$*

: Substituting the values of a, β and $\log_e R_0$ in the original equation we get:

$$: \quad 22.69r^2 - 28.43r + 0.000951889 = 0;$$

$$: \quad r = \frac{28.43 - \sqrt{808.26 - .0864}}{45.39} = 0.00003525$$

$r = .03525$ per 1000

* For the derivation of this formula see: "On the True Rate of Natural Increase," by Louis I. Dublin and Alfred J. Lotka, *Journal of American Statistical Association*, September, 1925, pp. 320-330.

The net result is that 100,000 females of Iowa at the fertility rates of 1929 and the adopted mortality schedule based on the Iowa Life Table give birth throughout their life to 100,095 daughters. One thousand present mothers of such a population are replaced by 1,001 (R_0) mothers within a generation (about 28.5 years). Clearly such a population is just slightly above the point of reproducing itself — even though its births at present greatly surpass its deaths. This present increase is a mere effect of the age-composition. We surely may regard it as stationary, without potential increase, notwithstanding the fact that the "crude" natural increase of Iowa for 1929 showed an excess of 6.7 (a birth-rate of 17.1 against a death-rate of 10.4.)

ZERO RATE OF NATURAL INCREASE

Iowa population had about reached its zero point of true natural increase in 1929. As calculated in Table 3 (column 5),[14] a birth-rate of 17.0 is that rate which, with the existing age-composition of Iowa population, is necessary to hold it stationary. The reported birth-rate for 1929 was 17.1 which is slightly above the zero-rate. Since that time the birth-rate has seemingly declined. According to the provisional

---

Table 3

Explanatory notes. It is obvious that in order that a population should remain stationary every person of the present generation has to be replaced by one in the future, or, to say it differently, the ratio of successive generations (R_0) has to be one. Our R_0, however, is slightly higher than one; it is 1.001. Our population consequently has about reached the *equilibrium* point of a stationary population. The problem is to find that birth-rate which, at the age-composition of our population in 1930, would keep our population at a standstill.

It is clear that if at the existing specific fertilities or maternity frequencies ($m(a)$'s), the R_0 is 1.001, then by reducing every maternity frequency $m(a)$ by the ratio 1:1.001, namely multiplying it by .999, we obtain the equilibrium maternity frequencies, column 4. Multiplying each item in column 4 by the corresponding item in column 2 and summing them up, we find that 17.0 is the necessary birth-rate that could keep our population at the existing age-composition of 1930 from decreasing. The birth statistics show a birth-rate of 17.1 in 1929 and 17.3 in 1930; palpably our population has about reached its equilibrium point in 1929.

For more detailed explanation of this computation, the reader is referred to "The True Rate of Natural Increase of the Population of the United States," by Louis I. Dublin and Alfred J. Lotka, *Metron*, Table VII, (8) 116-117.

[14] See notes to Table 3.

* For the derivation of this formula see: "On the True Rate of Natural Increase," by Louis I. Dublin and Alfred J. Lotka, *Journal of American Statistical Association*, September, 1925, pp. 330-339.

TABLE 3

Computation of Female Birth Rate in Iowa Giving Zero Rate of Natural Increase with Age Distribution as in 1930 Census

AGE GROUP	AGE DISTRIBUTION OF FEMALES (1930 CENSUS)	MATERNITY FREQUENCY $m(a)$ (DAUGHTERS ONLY) PER 100,000 FEMALES	MATERNITY FREQUENCY REDUCED PROPORTIONALLY TO MAKE RATIO OF SUCCESSIVE GENERATIONS EQUAL TO UNITY (3) x 0.999	PRODUCT (2) x (4)
1	2	3	4	5
10-14	9.57	7	7	.67
15-19	9.10	1,863	1,861	169.35
20-24	8.33	5,695	5,689	473.89
25-29	7.50	5,926	5,920	444.00
30-34	7.21	4,437	4,433	319.62
35-39	7.17	2,954	2,951	211.59
40-44	6.37	1,107	1,106	70.45
45-49	5.74	125	125	7.17
50-54	5.04	2	2	.10
Total	66.03	22,116	22,094	1,696.84
		x 5	x 5	
		110,580	110,470	

Birth rate for Zero Natural Increase: 16.97 or 17.0

figures published by the census, the birth-rates for 1930, 1931, 1932 were for Iowa 17.3, 16.8, and 16.2 respectively. Since 1930 the reproductive rates of Iowa are obviously not sufficient to maintain the population's number. However, 1929 is taken as a base, and the next step is to find the changes in the population that will occur.

TRUE RATE OF NATURAL INCREASE

The observed natural increase for Iowa was 6.7 in 1929. The "true" natural increase of Iowa population, free from the factors that are responsible for the high proportionality in our reproductive age-groups, is .03531 per thousand per annum instead of the observed 6.7, namely, no increase at all. The true rate was computed on the basis of Lotka's formula as it is done in Table 2. It is at this negligible constant rate of .04 per thousand that Iowa's population will increase yearly when stabilized, namely when it settles down to its fixed age-composition. This assumes, of course, that there will occur no change in the fertility and mortality rates that existed in 1929, and that no immigration or emigration will take place.[15]

STABILIZED POPULATION AND CORRECTED BIRTH AND DEATH RATES

It is necessary to distinguish between stabilized and stationary populations. The two terms are frequently interchanged and very often confused. To repeat, by a stabilized population is to be understood that ultimate population with its fixed age-composition which will be established when due time is allowed for the existing irregular age factors to fade out. It is, therefore, a function of time and the age-composition of a population. A stabilized population may be stationary if its fertility rates are just enough to keep it so, namely when its true rate is zero. It will become stationary, as it is in the case of Iowa, when the irregular age factor will be smoothed out, i. e., when it is stabilized. It may, however, be above the stationary point, if the true rate of natural increase is above zero, or below the stationary point, if r is below zero. A population in the first case will increase at a constant rate, in the other case decrease at a constant rate when stabilized.

[15] The 1930 Birth Statistics became available after the completion of the study. According to these new data, R_0 is 1.002 instead of 1.001 as computed on the basis of 1929 statistics. This changes r from .00003531 to .0000882; clearly a negligible change.

The age-composition of the future stabilized population was computed by applying Lotka's formula: $c\ (a) = be^{-ra}\ p\ (a)$, where $c\ (a)$ is the coefficient of age-distribution at pivotal age $a = 2.5, 7.5$, etc.; b the birth rate of the stabilized population; r the true rate of natural increase ($= .000035310$, in our case); $p\ (a)$ the survival probabilities as given in Table 4, column 2. The b for this formula, namely, the corrected birth-rate, was calculated on the basis of Lotka's formula: $b = \frac{e^{\int A'dr}}{L_0}$.[16] Our L_0 is 65.87; $L_1 = 2{,}437.55$; $L_2 = 124{,}456.74$. In such a manner, the b was found to be .01520 (15.20 per thousand). The age-distribution of the stable population is computed in Table 4, column 5. Exactly the same results were obtained by applying for these calculations Bortkiewicz's formula: $\sigma_x = (1 + r)^{-(x + \frac{1}{2})} \cdot s_x$,[17] where σ_x is the number of persons expected in the stabilized population; s_x is the number of persons in the corresponding age-groups of the stationary population, it is the life table; r as given here is the yearly increase, not the yearly rate of increase; it is not consequently our r, which is called in Bortkiewicz's terminology ρ. To avoid confusion, we shall denote Bortkiewicz's r as i and $(x + \frac{1}{2})$ as a; the formula would read: $\sigma_a = (1 + i)^{-a} . s_a$. Expressing it in terms of our r, where $r = \frac{\log (1 + i)}{\log e}$,[18] we shall have $\sigma_a = \frac{s_a}{e^{ra}} = s_a\ e^{-ra}$.[19] The difference between the two formulas is that in Lotka's formula we compute b first and then the $c(a)$ — the coefficient of age-distribution, whereas in Bortkiewicz's formula we find σ_a's first and then compute the "b" as the reciprocal of the summation of all the σ_a's $\left(\frac{1}{\Sigma\sigma_a}\right)$; in

---

[16] *Journal of the American Statistical Association*, September, 1925, p. 329 (formula 1); p. 335 (formulas 41, 42, 43).

[17] L. von Bortkiewicz: Die Sterbeziffer und der Frauenüberschuss in der stationären und in der progressiven Bevölkerung, *Bulletin de l'Institut international de statistique*, 1911, Vol. XIX, First Section, Part II, p. 106.

[18] See R. R. Kuczynski, *Fertility and Reproduction*, Methods of Measuring the Balance of Births and Deaths, Falcon Press, New York, pp. 26-32, 41-42, 86-87.

[19] Kuczynski constantly gives this formula in the above-mentioned book as $\sigma_a = \frac{s_a}{e^{-ra}}$ (instead of $\sigma_a = \frac{s_a}{e^{ra}}$) which is not so, as could be easily proved.

TABLE 4

Computation of Stable Female Population of Iowa and Its Percentage Age-Distribution

AGE GROUPS	SURVIVORS $p(a)$ AT PIVOTAL AGES, $l_{x+½}$	e^{-ra}	$p(a)\,e^{-ra}$	PERCENTAGE DISTRIBUTION OF STABLE POPULATION
1	2	3	4 = (2 x 3)	5 = (4 x 5b)
0- 4	95,252	.99991	95,243	7.24
5- 9	94,348	.99974	94,323	7.17
10-14	93,817	.99956	93,776	7.13
15-19	93,154	.99938	93,096	7.08
20-24	92,177	.99921	92,104	7.00
25-29	90,951	.99903	90,863	6.91
30-34	89,593	.99886	89,491	6.80
35-39	88,076	.99868	87,960	6.69
40-44	86,160	.99850	86,031	6.54
45-49	83,713	.99833	83,573	6.35
50-54	80,325	.99815	80,176	6.09
55-59	76,213	.99798	76,059	5.78
60-64	70,233	.99780	70,078	5.32
65-69	62,036	.99763	61,889	4.70
70-74	50,907	.99745	50,786	3.86
75-79	36,678	.99727	36,578	2.78
80-84	21,454	.99710	21,392	1.63
85-89	9,388	.99692	9,359	.71
90-94	2,604	.99674	2,596	.20
95-99	324	.99657	323	.02
100 & over	9	.99639	9	
	1,317,412		1,315,705	100.00
	x 5		x 5	
Total	6,587,060		6,578,525	

Expectation of Life: 65.87 years

Column 2: These factors $p(a)$ were computed from the complete Iowa Life Table for White Females (based on 1929-1931 Population Statistics) that was kindly furnished to us in advance of publication by the Statistical Bureau of the Metropolitan Life Insurance Company of New York.

Column 3: e = natural base of logarithms; r = the calculated true rate of natural increase = .000035310; a = the pivotal ages 2.5, 7.5, etc., until the end of the table.

Column 4 = (Column 2 x column 3), and column 5 = (Column 4 x 5b), where b is .0152 and is taken 5 times, as $c(a)$ is for 5-year periods.

our case it will equal $\frac{1}{65.785}$ (Table 4, bottom of column 4), namely, 15.20; exactly the same figure that we got by Lotka's formula.

TABLE 5

Computation of Female Birth Rate in Iowa for Stable Population

AGE GROUP	AGE DISTRIBUTION OF FEMALES (STABLE POPULATION) *Per cent*	MATERNITY FREQUENCY $m(a)$ (DAUGHTERS ONLY) PER 100,000 FEMALES	NUMBER OF DAUGHTERS BORN
1	2	3	4 = (2 x 3)
10-14	7.13	7	.50
15-19	7.08	1,863	131.90
20-24	7.00	5,695	398.65
25-29	6.91	5,926	409.49
30-34	6.80	4,437	301.72
35-39	6.69	2,954	197.62
40-44	6.54	1,107	72.40
45-49	6.35	125	7.94
50-54	6.09	2	.12
Total	60.59		1,520.34

Birth rate of Stable Population: 15.20

As another check against these calculations, the stabilized birth-rate was also computed by multiplying the per cent of the stable population in the child-bearing ages by their corresponding maternity-frequencies (see Table 5). This gave the same birth-rate of 15.20.

The r, the "true" rate of natural increase as given above is .03525 (per thousand). Consequently, our stable death-rate is 15.16 (15.20 — .04). Thus, a birth-rate of 15.20 will ultimately take the place of the existing birth-rate of 17.1, decreasing by 1.9, even though no changes in our fertilities occur. A death-rate of 15.16 will replace the present death-rate of 10.4, increasing by 4.8, if no changes take place in the mortality rates. These are the so-called corrected birth- and death-rates.

WHEN WILL THE STABILIZATION POINT BE REACHED?

Due time must be allowed for a population to become stabilized. To calculate how long it will take for the Iowa population to reach its stabilization point, the following procedure was adopted.

It is clear that persons, in our case females, who comprised the age group of under-5 in 1930, will make up the 5-to-9 group in 1935; the 5-to-9 group of 1930 will constitute the 10-to-14 group in 1935, and so on. Not all of them will survive. If out of 100,000 females, who started life together, 95,252 reach the pivotal age 2.5 (the under-5 group — Table 4, column 2), and but 94,348 out of the same 100,000 remain alive at the pivotal age 7.5 (the 5-to-9 group), then obviously, the probability of the under-5 group surviving in 5-to-9 group is .99051 (94,348/95,252). By the same method were calculated these probabilities for all age-groups. Having multiplied every age group in 1930 by its probability to survive five years from its time $\frac{l_{x+5}}{l_x}$, we found the estimated population for 1935 for all age groups from 5-to-9 group up. As for the under-5 group for 1935, the following procedure of calculation was undertaken.

The under-5 group should consist of the children born during this five-year period, 1930—1935. To find the number of children born, the mean populations in each of the reproductive five-year age groups from 10 to 54 were computed for the period 1930—1935. The 10-to-14 group, for instance, of 1930 counted 115,233 females; the number of females of the same group in 1935 was computed as 117,758; consequently, the mean population of this group for this period, which was computed on an arithmetical basis, should count 116,495 females (117,758 + 115,233/2). The maternity frequency for this group is 7; evidently, this group gives birth on the average to 8 daughters in a year (116,495 x 7). This same procedure was adopted in calculating the mean populations of the rest of the reproductive age groups up to 54. Their numbers were multiplied by their corresponding maternity frequencies (Table 2, column 2); and it was found that such a population should give birth, on the average, to 21,068 daughters per year. Thus, 105,340 (21,068 x 5) daughters should be born in the 1930—1935 period. These children, as pointed out before, should constitute the under-5 group of 1935. Their number should be 105,340, provided none of them dies. Their survival factor, however, is .95252;

TABLE 6

Iowa Female Population by Broad Age Groups 1900-2025

YEAR 1	0-19 2	20-39 3	40-59 4	60-79 5	80 & ABOVE 6	TOTAL 7
1900	461,057	336,194	174,010	69,182	5,825	1,046,268
1910	447,640	338,027	194,125	80,156	8,438	1,068,386
1920	459,080	372,445	226,666	95,274	10,464	1,163,929
1930	450,109	363,825	257,716	120,063	12,905	1,204,618
1935	438,274	381,799	283,070	133,034	13,813	1,249,990
1940	427,688	405,263	300,108	147,113	15,964	1,296,136
1945	419,504	428,759	313,292	162,010	18,039	1,341,604
1950	425,370	431,226	329,477	176,880	20,145	1,383,099
1955	435,606	420,089	346,144	193,941	21,879	1,417,639
1960	437,588	409,749	367,702	204,540	24,326	1,443,905
1965	434,275	401,988	388,883	212,423	26,786	1,464,355
1970	430,132	407,714	390,424	223,337	29,053	1,480,660
1975	428,976	417,424	379,390	236,293	31,807	1,493,890
1980	430,763	419,223	370,116	251,309	32,587	1,503,998
1985	432,874	417,074	364,360	264,515	33,247	1,512,070
1990	434,406	412,079	370,982	262,448	35,523	1,515,438
1995	433,791	411,018	379,436	252,568	37,802	1,514,615
2000	432,828	412,749	380,152	247,295	40,370	1,513,394
2005	432,463	414,759	377,101	246,214	41,884	1,512,421
2010	432,274	416,209	372,712	252,125	39,405	1,512,725
2015	433,062	415,605	371,894	256,457	36,633	1,513,650
2020	433,565	415,021	373,506	255,473	37,398	1,514,963
2025	433,819	414,340	375,624	252,911	38,721	1,515,415

consequently, the under-5 group of 1935 should count 100,338 daughters. The computation of the 1935 population is thus complete.

This procedure was successively repeated in computing the 1940 population on the basis of 1935; the population for 1945 on the 1940 basis, and so on up to 2025. The successive populations are summarized by broad age periods in Table 6.[20]

TABLE 7

Per Cent Distribution of Iowa Female Population (Years: 1930, 1950, 1975, 2000), as Compared with the Distribution of Stable Population

AGE GROUPS	STABLE POPULATION	YEARS: 1930	1950	1975	2000
1	2	3	4	5	6
0- 4	7.24	8.86	8.14	7.34	7.21
5- 9	7.17	9.83	7.95	7.19	7.13
10-14	7.13	9.57	7.56	7.11	7.16
15-19	7.08	9.10	7.09	7.09	7.10
20-24	7.00	8.33	7.47	7.18	7.04
25-29	6.91	7.50	8.25	7.20	6.91
30-34	6.80	7.21	7.96	7.00	6.74
35-39	6.69	7.17	7.50	6.58	6.58
40-44	6.54	6.37	6.78	6.07	6.47
45-49	6.35	5.74	6.01	6.28	6.43
50-54	6.09	5.04	5.63	6.76	6.34
55-59	5.78	4.24	5.41	6.27	5.87
60-64	5.32	3.64	4.52	5.53	5.22
65-69	4.70	2.89	3.71	4.52	4.32
70-74	3.86	2.14	2.78	3.37	3.76
75-79	2.78	1.29	1.78	2.38	3.05
80-84	1.63	.69	.97	1.41	1.74
85-89	.71	.30	.38	.56	.72
90-94	.20	.08	.10	.14	.19
95 & over	.02	.01	.01	.02	.02
Total	100.00	100.00	100.00	100.00	100.00

[20] These tables by five-year age groups are given in "The Future Growth of Iowa Female Population," by Bernard D. Karpinos, Ph. D. Thesis, State University of Iowa, Iowa City, Iowa, 1934.

On the basis of these tables, the per cent distribution of Iowa female population for the years 1950, 1975, and 2000 was worked out and compared with the age-distribution of the stable population (see Table 7).

The contrast between the age-composition of 1930 and that of the stable population is very conspicuously reflected in Figure 1. The deviations in the age groups of below 40, in the 1930 population are very much above those in the stable population, whereas its deviations from 40-and-above are strikingly below. The fluctuations between the age-distribution curve of 1975 and that of the stable population, as

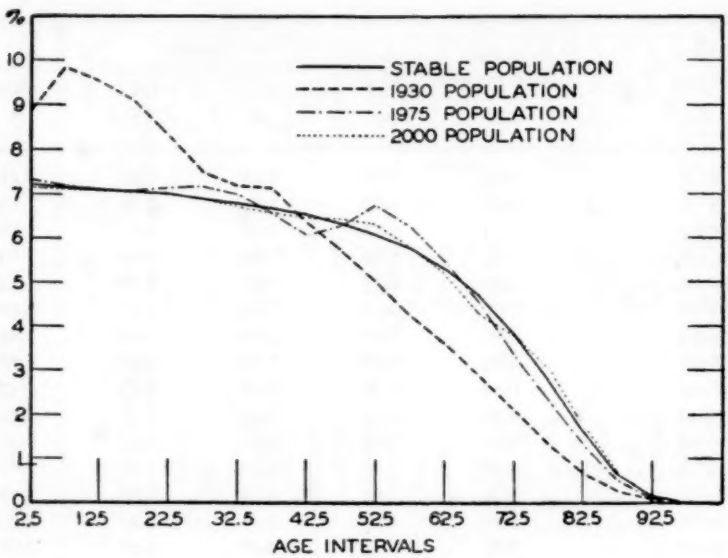


FIGURE 1.

evidenced in Figure 1, are relatively small, and they hardly exist when the age-composition of the 2000 population is compared with that of the stable one. This means that the stabilization point will be about completely reached in the last quarter of the present century. It will take, evidently, about two generations for the age factors to settle down.

THE FUTURE MOVEMENT OF IOWA FEMALE POPULATION

As is seen from Table 6 and Figure 2, Iowa's population will continue to increase in spite of the fact that the fertilities in 1929 were just sufficient to keep it stationary. But, as has been pointed out, this increase is due only to the age factors. The *total* population will increase up to about 1990 and then become stationary or nearly so; beyond that point the growth curve becomes almost a straight line. It will increase ultimately to about 26 per cent above the 1930 level (Table 8,

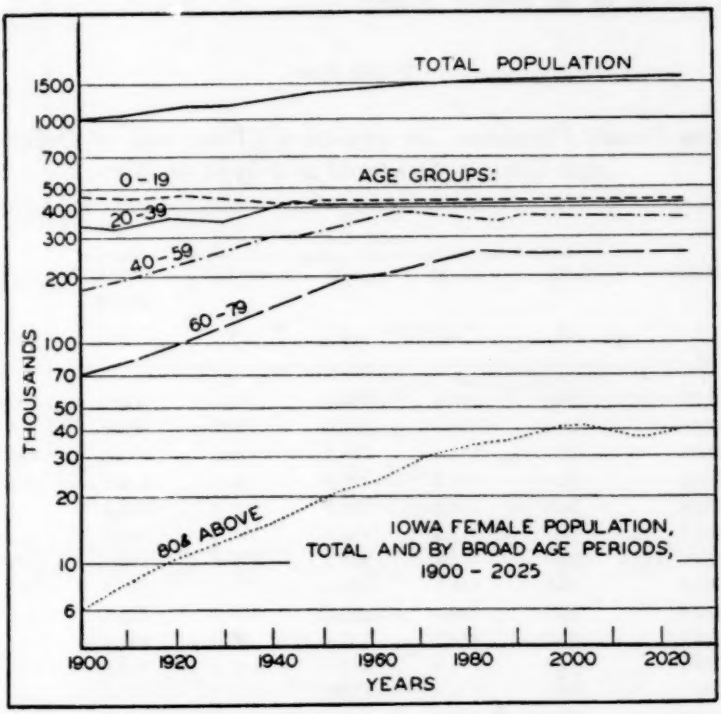


FIGURE 2.

column 7). However, this increase will be mostly concentrated in the age-groups of 40-and-above. The young group of under 20 years of age will decrease. When stabilized, this group will make up 96 per cent of what it was in 1930. The age group of 20-to-39 will show an increase

of 14 per cent; the 40-to-59 age group will be about 45 per cent above 1930; the 60-to-79 group will more than double, and the 80-and-above group will triple. Figure 3 brings this out clearly.

The 0-to-19 age group will reach its highest point of growth around the 60's; the next age group of 20-to-39 will also culminate about the same time. The 40-to-59 age group will attain its peak with the end of the century. The older age group will increase even beyond the year 2000: the 60-to-79 group will settle down at about the year 2015; but the 80-and-above group will continue to increase even beyond the first quarter of the coming century.

TABLE 8

Iowa Female Population for 1930-2025 (Total, and of Different Age Groups) Compared with 1930 as Base

YEARS	AGE GROUPS					TOTAL
	0-19	20-39	40-59	60-79	80 and above	
1	2	3	4	5	6	7
1930	100.0	100.0	100.0	100.0	100.0	100.0
1935	97.4	104.9	109.8	110.8	107.0	103.8
1940	95.0	111.4	116.4	122.5	123.7	107.6
1945	93.2	117.8	121.6	134.9	139.8	111.4
1950	94.5	118.5	127.8	147.3	156.1	114.8
1955	96.9	115.5	134.3	161.5	169.5	117.7
1960	97.2	112.6	142.7	170.4	188.5	119.9
1965	96.5	110.5	150.9	176.9	207.6	121.7
1970	95.6	112.1	151.5	186.0	225.1	122.9
1975	95.3	114.7	147.2	196.8	246.5	124.0
1980	95.7	115.2	143.6	209.3	252.5	125.3
1985	96.2	114.6	141.4	220.3	257.6	125.5
1990	96.5	113.3	143.9	218.6	275.3	125.8
1995	96.4	113.0	147.2	210.4	292.9	125.7
2000	96.2	113.4	147.5	206.0	312.8	125.6
2005	96.1	114.0	146.3	205.1	324.6	125.6
2010	96.0	114.4	144.6	210.0	305.6	125.6
2015	96.2	114.2	144.3	213.6	283.9	125.7
2020	96.3	114.1	144.9	212.8	289.8	125.8
2025	96.4	113.9	145.8	210.6	300.0	125.8

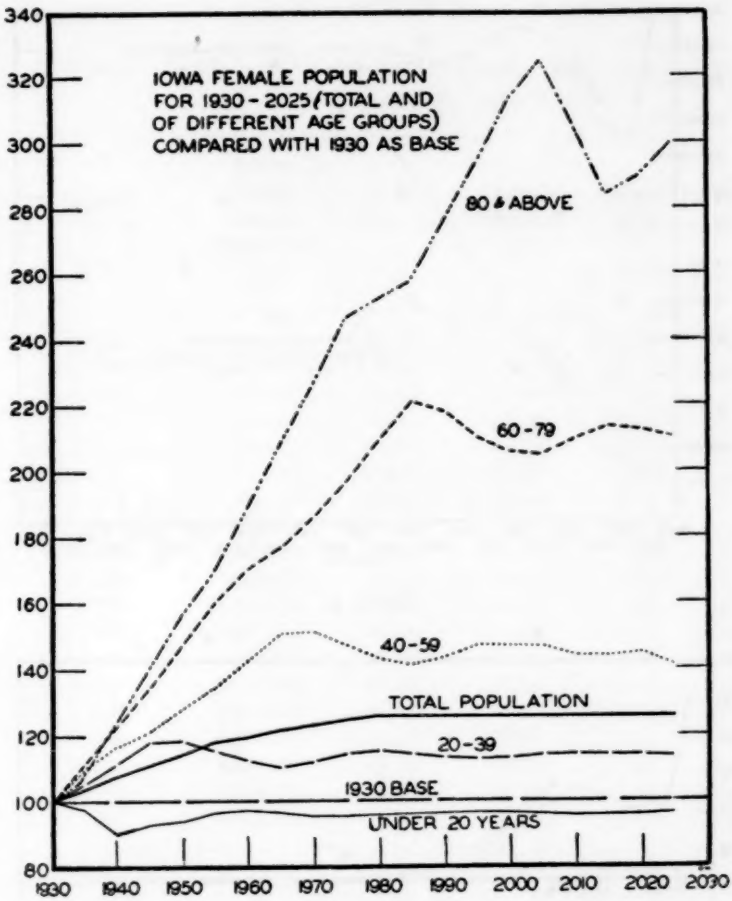


FIGURE 3.

FUTURE BIRTHS AND BIRTH-RATES, DEATHS AND DEATH-RATES OF IOWA POPULATION

The next step was to find the consequent changes that will take place in the births and birth-rates and the deaths and death-rates during the time of stabilization.

It was proved above that the stable birth-rate will be 15.20, and the stable death-rate 15.16. There will be, consequently, a gradual decline in the birth-rate from 17.1 in 1929 to 15.20 at about the end of the

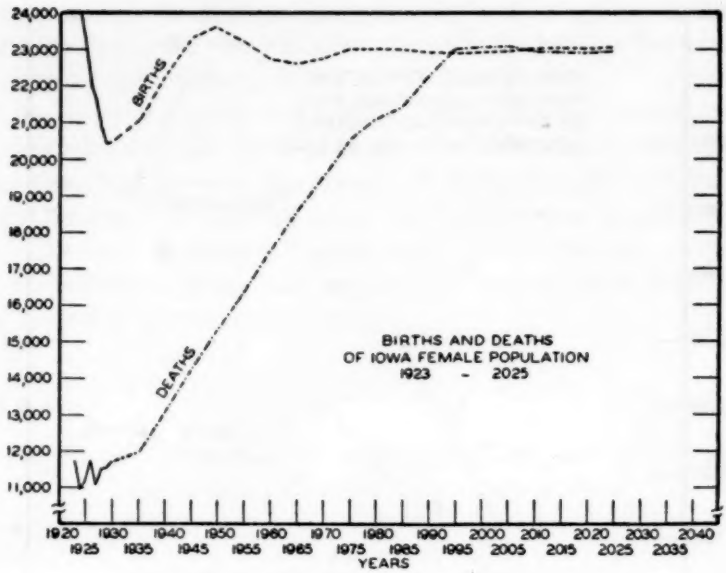


FIGURE 4.

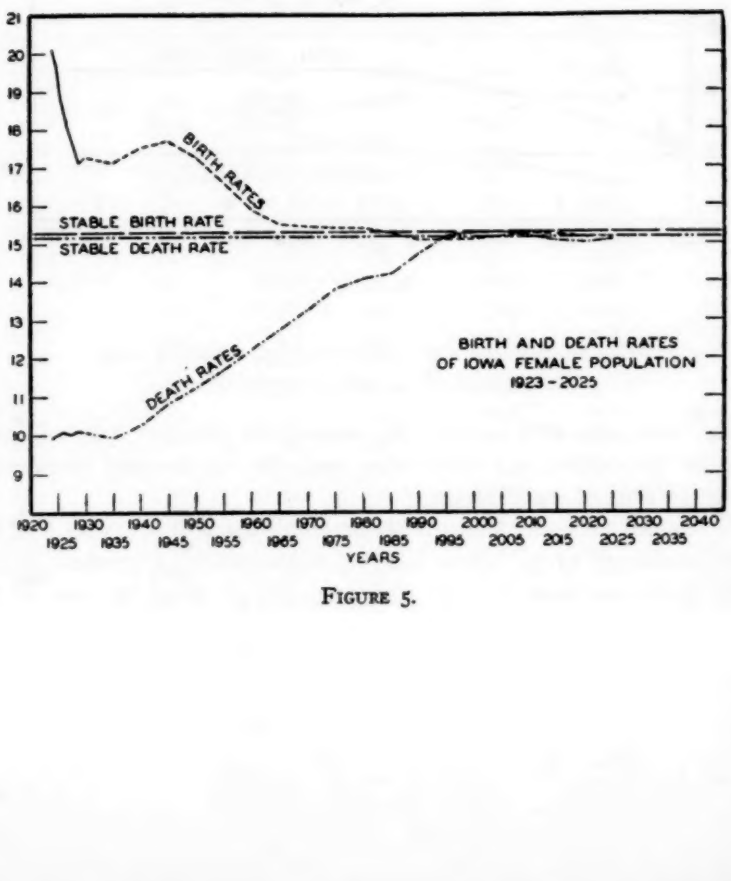


FIGURE 5.

TABLE 9

Female Births and Birth-Rates, Deaths and Death-Rates of Iowa Population, 1935-2025

YEARS	TOTAL MEAN FEMALE POPULATION	BIRTHS (FEMALE)	DEATHS (FEMALE)	BIRTH RATE	DEATH RATE
1	2	3	4	5 = (3:2)	6 = (4:2)
1930-1935	1,227,304	21,068	11,994	17.17	9.77
1935-1940	1,273,063	22,301	13,052	17.52	10.27
1940-1945	1,315,955	23,318	14,224	17.72	10.81
1945-1950	1,362,351	23,649	15,350	17.36	11.27
1950-1955	1,400,369	23,263	16,355	16.61	11.68
1955-1960	1,430,772	22,744	17,488	15.90	12.22
1960-1965	1,454,130	22,619	18,529	15.56	12.72
1965-1970	1,472,507	22,762	19,501	15.46	13.24
1970-1975	1,487,275	23,008	20,562	15.47	13.82
1975-1980	1,498,944	23,118	21,096	15.42	14.07
1980-1985	1,508,034	23,065	21,451	15.29	14.22
1985-1990	1,513,754	22,949	22,275	15.16	14.72
1990-1995	1,515,027	22,881	23,045	15.10	15.21
1995-2000	1,514,005	22,913	23,157	15.13	15.30
2000-2005	1,512,907	22,991	23,185	15.20	15.32
2005-2010	1,512,573	23,047	22,986	15.24	15.20
2010-2015	1,513,189	23,049	22,864	15.23	15.11
2015-2020	1,514,307	23,021	22,758	15.20	15.03
2020-2025	1,515,189	23,045	22,955	15.21	15.15

century, followed by a parallel rise in the death-rate from 10.4 to 15.16, during the same time. These subsequent changes are given in Table 9 and plotted in Figures 4 and 5.

The manner in which the births were computed was explained above. As to the deaths, let us assume that the whole 1930 population will be alive in 1935, and let us also suppose that all the female children born during this 5-year period will survive; then, the population in 1935, for instance, would be: 1,204,618 (total population in 1930) plus 105,340 female births, a grand total of 1,309,958. However, the total for 1935 was, as calculated, 1,249,990; consequently, 59,968 females have died during these 5 years, or 11,994 per year. The same

procedure was followed in calculating the deaths for the populations of the other years. Their numbers are tabulated in Table 9, column 4.

A glance at the births will reveal the fact that no great changes will occur in their numbers. The stabilized number of female births will be about 23,045, whereas the 1929 statistics give 20,538 female births. Evidently, no big difference as to the total number of births.

The great changes will take place in the numbers of deaths. They rise in a very steep manner. The mortality statistics give 11,742 female deaths for Iowa in 1929. This number will increase up to 22,955, according to our computations, only 90 below the number of births. In fact, the deaths may even surpass the births before they have become stabilized. (Compare the births and deaths for the years 1990-2000; see Table 9 and Figure 4.)

The future birth-rates will increase at first — paradoxical as it may seem — and then gradually decline. They will become constant at about 15.20 as seen from Table 9, column 5. This again furnishes an additional check upon the theoretical computation of the stable birth-rate. The future death-rates will rise abruptly (Figure 5), fluctuating ultimately around 15.20 — in consistency with the theoretical computed death-rate.

CHANGES IN THE AGE-COMPOSITION OF IOWA FEMALE POPULATION

Among the utmost important changes that will take place in the population are those in age-composition. Such changes have been taking place in the Iowa population for some time. A steady decline has been going on in the younger age periods, and a corresponding increase in the older age groups. Whereas in 1900 the young female generation under 20 years comprised 44.1 per cent of the whole population, it shrank in 1930 to 37.4 per cent (Table 10). The population in the age periods of 20-to-39 had been also declining, dropping from 32.1 per cent in 1900, to 30.2 in 1930.

On the other hand, the older age groups have been rapidly increasing. The 40-to-59 group moved up from 16.6 to 21.4 per cent; the 60-to-79 group rose from 6.6 to 10.0, and the 80-and-over group increased from 0.6 to 1.1.

These shifts in the age-composition will be more and more enhanced as the stabilization process goes on. When stabilized, the young group of under-20 will make up only 28.6 per cent of the total female popula-

tion, a decline of 8.8 per cent, as compared with the per cent of the same group in 1930. The 20-to-39 group will decline from 30.2 per cent in 1930 to 27.4 in the stabilized population. On the other hand, the proportions of the older age group will be very much increased. In 1930, 21.4 per cent of the total population belonged to the 40-to-59

TABLE 10

Per Cent Distribution of Iowa Female Population by Broad Age-Groups, Years 1900-2025, and Also of Stable Population

YEARS	AGE - INTERVALS					TOTAL
	0-19	20-39	40-59	60-79	80 and above	
1	2	3	4	5	6	7
1900	44.07	32.13	16.63	6.61	.56	100.
1910	41.90	31.64	18.17	7.50	.79	100.
1920	39.44	32.00	19.47	8.19	.90	100.
1930	37.36	30.21	21.39	9.96	1.08	100.
1935	35.07	30.54	22.65	10.64	1.10	100.
1940	33.00	31.26	23.16	11.35	1.23	100.
1945	31.27	31.96	23.35	12.08	1.34	100.
1950	30.75	31.18	23.82	12.79	1.46	100.
1955	30.73	29.63	24.42	13.68	1.54	100.
1960	30.30	28.38	25.47	14.17	1.68	100.
1965	29.66	27.45	26.56	14.50	1.83	100.
1970	29.05	27.54	26.37	15.08	1.96	100.
1975	28.71	27.94	25.40	15.82	2.13	100.
1980	28.64	27.87	24.61	16.71	2.17	100.
1985	28.63	27.58	24.10	17.49	2.20	100.
1990	28.67	27.19	24.48	17.32	2.34	100.
1995	28.64	27.14	25.05	16.67	2.50	100.
2000	28.60	27.27	25.12	16.34	2.67	100.
2005	28.59	27.43	24.93	16.28	2.77	100.
2010	28.58	27.51	24.64	16.67	2.60	100.
2015	28.61	27.45	24.58	16.94	2.42	100.
2020	28.62	27.40	24.65	16.86	2.47	100.
2025	28.63	27.34	24.78	16.69	2.56	100.
Stable Population	28.62	27.40	24.76	16.66	2.56	100.

group, but when stabilized its percentage will rise to 24.8. The 60-to-79 group which constituted, in 1930, 10 per cent of the total female population, will make up 16.7 in the stable population. The 80-and-above group will rise from 1.1 per cent in 1930, to more than two and one-half per cent when stabilized. These great changes in our future age-composition are graphically presented in Figure 6, where the age-com-

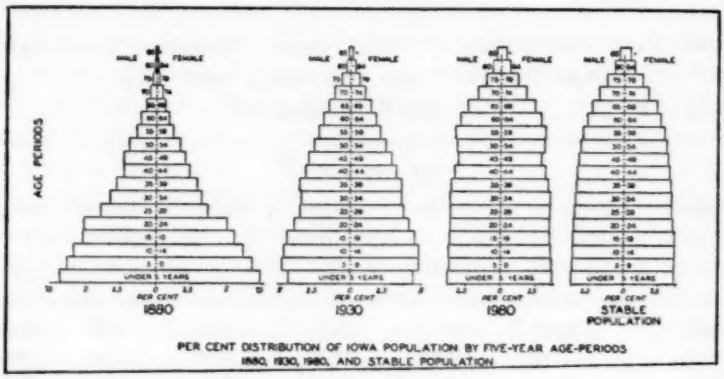
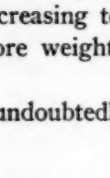


FIGURE 6.

position, by 5-year periods, of the stable population is contrasted with those of 1880, 1930 and 1980. A pronounced contraction at the base of the stable population pyramid, as compared with the one of 1880 or 1930, is to be noticed, accompanied by an outstanding expansion at the top. The 1980 population occupies a middle position, portraying a population with a heavily increasing top. This means that the population will become steadily more weighted with older people, as time goes on.

Such age changes will undoubtedly challenge new social and economic adjustments.[21]

[21] See: Warren S. Thompson and P. K. Whelpton, *Population Trends in the United States*, McGraw-Hill Book Company, New York, 1933, 168-171.



A STUDY OF DIFFERENTIAL FERTILITY IN TWO CALIFORNIA CITIES

BY BARBARA S. BURKS AND HAROLD E. JONES*

Institute of Child Welfare, University of California

A NEGATIVE correlation, usually of the order of —.2 or —.3, has often been reported between family size and children's IQ. A corollary finding is a negative correlation between family size and socio-economic status.[1]

There are, however, indications that in some regions and under certain conditions, the differential birthrate is disappearing or even reversing its direction.

Edin,[2] using Census data for 1920, in Stockholm, has reported such a reversal, at least with respect to family income. The birth rate in Stockholm (11.2 by 1927) is one of the lowest of any city in the world. Although Stockholm had no gen-

*We wish to acknowledge the assistance of Miss Frances M. Welch who collected socio-economic data for a group of Berkeley families and who supervised the preliminary statistical reduction of the Berkeley data; Miss M. Agnes Covalt, who secured vital statistics for the same families; and E. L. Kinser, E. G. Mathews, and Miss Helen V. Clauson, who performed the preliminary statistical computations of the study. Acknowledgments are also due to the Department of Research of the Oakland Public Schools for placing at our disposal intelligence tests administered in all the eighth grades of the city, together with data upon family composition secured from pupils at the time of testing.

[1] Representative correlations between IQ and number of children in family are: Chapman and Wiggins (*J. Genet. Psychol.*, 1925, 32, 414-421) —.22 for 253 children of American families, —.24 for 180 children of foreign-born families, —.33 for 632 unselected children; Lentz (*J. Educ. Psychol.*, 1927, 18, 486-496), —.30 for 4330 cases in ten or more cities, grades 1-12. Chapman and Wiggins also reported a correlation of .32 between intelligence of child and socio-economic status. A good example of the inverse relation between occupational status and family size is found in a study by Huntington and Whitney, (The Builders of America, *N. Y.*: Morrow, 1927, pp. 34-35) showing that in a laboring population the average number of children in completed families was approximately 5.2, as contrasted with only 2.6 in the families of teachers and 2.4 in the families of physicians.

[2] Edin, K. A. The birth rate changes. *Eug. Rev.*, 1929, 20, 258-266. The fertility of the social classes in Stockholm. In: Problems of Population. *London*: Allen and Unwin, 1932, pp. 91-101.

erally accessible contraceptive clinics at the time of Edin's investigation, neo-Malthusian propaganda had been carried out among the laboring population since 1910.[3] Tietze[4] showed that the great decline in German birth rate during the last generation had been accompanied by changes in the differential; that by the period 1925-1929 the birth rate among the small bourgeoisie, for example, exceeded the rates found among clerks and skilled workers. It may be no coincidence that this period witnessed an important growth in clinic facilities. In 1919 there was only one birth control clinic in Germany; by 1929 there were at least sixteen in various cities; and about 150 of the marriage advice stations, sickness insurance offices, etc., were prescribing as well.[5]

It is of course well known that family size is only one factor contributing to the differential birth rate; evidence is available that in families of lower intellectual status the interval between generations tends to be less, and the rate of "turnover" greater.

Conrad and Jones[6] showed that even where the usual family size differential is absent, a slight positive correlation may remain between the mother's intelligence and her age at childbearing. Furthermore, in groups characterized by a later age of marriage, an increased proportion of celibates may be expected.

DATA OBTAINED IN PRESENT STUDY

The data reported in the present study are derived from two sources:

A. In Oakland, California, in September 1932, the Terman Group Test of Mental Ability was administered to all the second semester eighth grades in the seventeen junior high schools of the city. For each of the children tested (numbering 1649) the following data were obtained:

Child's age
Child's I.Q. (using mental age norms of Terman Group Test Manual)

---

[3] Wicksell, K. Report on Sweden. In: Report of Fifth International Neo-Malthusian and Birth Control Conference, London, 1922. *London*: Heinemann, 1922, p. 11.

[4] Tietze, C. The differential birth rate changes in Germany. *Eug. Rev.*, 1932, 24, 31-35.

[5] Robinson, Caroline H. Seventy Birth Control Clinics. *Baltimore*: Williams and Wilkins, 1930, pp 8-10; 333.

[6] Conrad, H. S., and Jones, H. E. A field study of the differential birth rate. *J. Amer. Statis. Asso.*, 1932, 27, 153-159.

Ages of child's siblings (living and dead, but not including stillbirths)
Birthplace of parents
Occupation of father

B. Between January 1, 1928 and June 30, 1929, every third Berkeley, California family in which a child was born was selected for inclusion in a survey of child development and socio-economic conditions by the Institute of Child Welfare of the University of California. Stillbirths as well as live births were included. Of 470 families thus eligible, 405 families were actually contained in the survey group. Various reasons such as death of mother, removal of family to another region, or lack of family co-operation accounted for the lost cases, but caused little disturbance in the composition of the group with respect to age, color, and nativity of parents, occupation of father, and birth order of infant.

In the present study, data from only the 366 white families of the survey group were utilized. Twenty-three cases in which the mother had been previously married and three families containing no living child were also omitted, which left 340 families or 84 per cent of the total survey sample. From the extensive material collected for these families, the following data were germane to the present study:

Birthplace of parents
Age of mother at first pregnancy
Age of mother at birth of first living child
Natal intervals between births of living children
Socio-economic Index (a composite rating based upon the five variables listed immediately below)
Family income (measured in auxiliary scores empirically selected so that the regression of income upon father's years of schooling and father's occupational rating would be linear)[7]
Occupational rating (according to the Barr Scale of mental ability judged necessary for average success in various occupations)[8]

[7] Further data upon these measures can be found in a study of the socio-economic status of four hundred and five Berkeley families in the years 1928 and 1929 to be published by the Institute of Child Welfare, University of California.

[8] Discussion of derivation and use of the Barr Scale is contained in Terman, L. M., *et al.* Genetic Studies of Genius, Vol. I, Stanford University Press, 1925, pp. 66-69.

Years of schooling of parents

Berkeley Social Rating (a composite rating based upon ratings of house exterior, neighborhood, yard, living room, family accommodations, and special equipment)[7]

COMMUNITY BACKGROUND

Brief characterizations follow of the cities in which the data were collected:

Oakland, California, is a city of 284,000 population, according to the 1930 Census. 94.2 per cent of the population is white, and 76.8 per cent is native white. The corresponding figures for California are 88.8 per cent and 74.5 per cent; for the total United States, 88.7 per cent and 77.8 per cent.

Of 95,000 gainfully employed males over ten years of age, 4.6 per cent are listed under "professional and semi-professional service" (not including recreation and amusement), whereas only 2.7 per cent are listed under "domestic and personal service," and 1.6 per cent under agriculture. In the state as a whole, 4.7 per cent are listed in the professional and semi-professional group, 6.8 per cent under "domestic and personal service," and 16.6 per cent under agriculture. The corresponding figures for the total United States are 3.5 per cent, 4.4 per cent, and 25.1 per cent.

California schools rank high among the schools of other states. Ayres' index numbers based upon ten items involving attendance and expenditures gave California, in comparison with the 47 remaining states and District of Columbia, third place in 1890, fourth place in 1900, second place in 1910, and second place in 1918.[8] A comparison of Oakland and other regions with respect to school attendance of minors of secondary school and college ages is instructive. The Oakland figures show up very favorably, though not as favorably as those for Berkeley.

	Proportion of population of given ages attending school	
	16 and 17	18 to 20
Oakland	88.8	33.4
Berkeley	94.0	56.9
California	82.1	32.7
Urban United States	60.5	22.5
Total United States	57.3	21.4

The birth rate in Oakland was 18.9 in 1920 and only 14.7 in 1930. The corresponding decline between 1920 and 1930 in California was from 19.3 to 14.7, and in the United States Birth Registration Area from 23.7 to 18.9. In spite of its low birth rate the population of Oakland is increasing rapidly (from 216,000 in 1920 to 284,000 in 1930, or 31.5 per cent) because of the influx from other parts of the country.

---

[8] Ayres, L. P. An Index Number for State School Systems. *N. Y.*: Russell Sage Foundation, 1920.

A clinic for contraceptive advice was founded in 1929 under the auspices of the Alameda County Birth Control League.[10] Between 1925 and 1929 gynecological clinics in two of the county health centers had given contraceptive service to a limited number of cases. The present clinic accepts any married woman who applies, and charges from $2.00 to $10.00 to patients who are able to pay, but makes no charge to women who would find it very difficult to pay even the minimum fee. Although about 500 patients a year have passed through the clinic (which serves all of Alameda County, population 475,000 in 1930), it is not likely that many of the families of our Oakland subjects have been affected by it, since most of the families were complete before the clinic was founded.

Berkeley, California, with a population of 82,000 at the 1930 Census, is adjacent to Oakland. In addition to being the seat of the State University, it has a distinctly suburban character, providing dwellings for thousands who are employed in Oakland and in San Francisco across the Bay. Of the fathers of the 405 Berkeley survey families, only 38 per cent were employed in Berkeley. 94.5 per cent of the population is white and 79.6 per cent is native white. Of 24,600 gainfully employed males over 10 years of age, 11.8 per cent are engaged in professional services (exclusive of recreation and amusement), only 2.6 per cent in domestic and personal service, and 2.1 per cent in agriculture. We have seen that by certain objective criteria, Berkeley's educational status is exceptionally high. In the particular group here considered, over 30 per cent of the mothers had attended college or normal school.

The birth rate of Berkeley (18.4 in 1920, 12.9 in 1930)[11] is even lower than that of Oakland, but the relative increase of population has been even more rapid (from 56,000 to 82,000, or 46.5 per cent, between 1920 and 1930).

A clinic for contraceptive advice was established in 1924 in connection with the Berkeley Health Center,[12] a medical service operating under city and Community Chest funds. In 1929, when the Alameda County Mothers' Clinic was established in Oakland, cases were referred there and the Berkeley birth control clinic disbanded. The clinic served only patients who had urgent physical, mental, or economic reasons for family limitation, and who signed a statement to the effect that the practice of contraception was not in conflict with their religious beliefs. A small charge was made to patients able to pay. A total of only 95 patients received advice at the clinic during approximately four and one-half years of its existence, so it may be questioned whether the clinic affected any significant

---

[10] Information furnished through the courtesy of Mrs. Frances Wylie, social worker of the Alameda County Mother's Clinic.

[11] These rates are corrected figures from which the births in Berkeley to Oakland and San Francisco residents are subtracted, and to which the births in Oakland or San Francisco to Berkeley residents are added. Figures furnished by the Berkeley Health Department. Crude rates (as compiled by U. S. Bureau of the Census) were 17.1 for 1920 and 9.5 for 1930.

[12] Information furnished through the courtesy of Mrs. Mary Osgood, social worker of the Berkeley Health Center.

number of the mothers of the group studied in Berkeley. The county clinic had been in operation only a few months at the close of the period of the Berkeley survey.

It should be observed that in California it is not legally possible for birth control clinics to advertise their services.

RESULTS

Data for the Oakland group were treated to show differential family size; data for the Berkeley group, in view of the fact that nearly all are incomplete families, have been analyzed in terms of differential primary intervals and natal intervals.

OAKLAND GROUP

1. *Correlation data.* For the Oakland eighth grade pupils whose sibships were estimated to be complete, correlations were computed between Terman Group test IQ's and the size of their sibships (including deceased siblings). Two criteria were used, separately, to estimate completeness of sibships: (a) the youngest sibling had reached six years or over. The cases included here constitute sample 1; (b) the youngest sibling had reached nine years or over. The cases included here constitute sample 2. A correlation was computed separately for the pupils of native white parentage.[13]

Table 1 shows a trifle less evidence for differential fertility in the native white group than in the total group, the respective correlations being —.18 and —.22 when "sibs nine years or over" is the criterion for completeness.

Approximate corrections have been made to allow for (a) the negative correlation between IQ and chronological age commonly found among unselected children within the age range of our subjects, and (b) restriction in the dispersion of sibship size through the elimination of large families which could not meet the criterion of "sibs nine years or over." The correction for age was effected by taking pupils within a

[13] Data available for the Oakland pupils included birthplace of parents, but not color. Cases of white parentage were accordingly sorted out in the following way: Inquiry was made at each school represented as to the proportion of white pupils in the school. In the schools containing less than 99 per cent of white pupils (9 out of 17 schools), a check was made upon the racial origin of each pupil in the group studied. The "native-white" group as finally segregated (644 cases) may have contained as many as three or four non-white cases from the remaining schools not so checked.

TABLE 1

Correlations Between I.Q. and Size of Sibship, Oakland Eighth Grade Pupils

	r	P.E.$_r$	NO.
Total Group			
Sample 1: sibs 6 years or over	—.23	.02	1328
Sample 2: sibs 9 years or over	—.22	.02	1140
Native white parentage (from Sample 2)	—.18	.03	644
Corrections (Sample 2)			
Restricted age group (13-4 to 14-3)	—.20	.03	642
Corrected for restricted dispersion of IQ at a given grade-age	—.25	.04	642
Corrected for restricted dispersion of sibship size	—.27	.03	1140
Corrected for both IQ and sibship restriction	—.31	.04	1140

single year span (13-4 to 14-3, which included the children who were distributed symmetrically around the modal age for the group), and correcting the correlation found in this group for the resulting *restricted range of IQ*.[14] The correction was not large, raising the correlation —.20 for the restricted group to —.25, a value only .03 greater in magnitude than the correlation —.22, for the total group.

[14] The restriction of range comes about through the fact that within a single grade and a single year interval bright accelerated children and dull retarded children are lost from the sample.

The correction formula used was No. 186 in Kelley's *Statistical Method*, $\frac{r_{12}\Sigma_1/\sigma_1}{\sqrt{1-r_{12}+r_{12}^2(\Sigma_1/\sigma_1)^2}}$ in which r and R are the correlations in the restricted and total ranges respectively, σ_1 is the standard deviation in IQ, 10.70, of the restricted age group, and Σ_1, the corresponding S.D., 13.73, in the total group. The latter S.D. is of course spuriously raised a little by the correlation between I.Q. and C.A.; the small correction can thus be considered a maximum correction. Probable errors of R were calculated by formula No. 300 in Kelley.

The correction for restriction in the dispersion of sibship size[15] raised the magnitude of the correlation, —.22, to —.27. When this latter correction was applied simultaneously with the correction for age, a correlation of magnitude —.31 was obtained.

2. *Mean IQ according to family size.* For sample 2, the mean IQ was computed for children classified according to size of sibship (Table 2). In the total group the difference between mean IQ of chil-

TABLE 2

I.Q.'s of Oakland Children from Various Sizes of Sibship

SIZE OF SIBSHIP	I.Q.'S OF CHILDREN IN ALL COMPLETED FAMILIES			I.Q.'S OF CHILDREN IN COMPLETED NATIVE WHITE FAMILIES		
	Mean	S.D.	No.	Mean	S.D.	No.
1	102.9	11.9	241	103.5	12.9	154
2	103.4	14.6	429	105.3	12.7	215
3	100.2	13.1	295	103.7	12.6	114
4	99.5	13.7	156	102.4	12.1	61
5	93.1	11.9	90	101.9	*	21
6	95.7	13.2	48	97.3	*	15

* Standard deviation not computed because of the small number of cases.

[15] An estimate of the dispersion of the ultimate completed size of sibships of all pupils contained in the eighth grade sample was made by calculating the distribution of sizes of completed sibships which would yield the composition of birth orders occurring in the sample, assuming a stable composition of population. Migration plus the fact that the birth rate of Oakland is falling fairly rapidly would prevent this last assumption from being perfectly realized; the falling birth rate would probably cause the estimated S.D. of size of completed sibships to be a little high. Thus the use of the values $\sigma_1 = 1.62$, $\Sigma_1 = 2.02$, in Kelley's formula No. 186 probably results in a maximum estimate of correlation corrected for restricted range.

Techniques for estimating the distribution of sizes of completed fraternities in a population represented by a random sampling of individuals have been described by Gini (*Biblioteca dell'Economista,* 1910, 20, Ser. 5, pp. 82-83) and by Burks (*J. Amer. Statis. Asso.,* 1933, 28, 388-394). It should be mentioned that in adapting the method to the present problem, the estimate of dispersion, i.e. of Σ_1, was made for families of unselected offspring, not for unselected fertile families.

dren in the smallest and largest families is about 7 to 10 points, or a little over half a standard deviation of IQ (cf. Table 5). Within the native white group, also, differences are in the same direction but smaller. It is worth noting that both in the total group and in the native white group, IQ's for two-child families average slightly, though not reliably, above those in one-child families. It is possible that this represents the beginnings of a reversal in birth differential, at least among families in which the number of offspring is efficaciously controlled. No attempt was made to correct for age the mean IQ's of table 2, since the mean age, 13-10, of the children from one-child families differed by only four months from the mean age, 14-2, of the children from six-child families.

3. *Family size according to socio-economic status.* Estimates of the mean size of completed sibships for unselected fertile families in various occupational and natio-racial groupings were calculated, with results shown in Tables 3 and 4. The method used has been described independently by Gini and by one of the authors [16] and requires only

TABLE 3

Estimated Mean Size of Completed Sibship According to Occupational Status of Father

OCCUPATION *	TOTAL GROUP			NATIVE WHITE		
	Mean	σ_m	No.	Mean	σ_m	No.
Professional and Executive	2.0	.37	55	1.9	.29	40
Semi-professional and Clerical	2.1	.11	363	2.0	.13	248
Skilled Labor	2.6	.16	423	2.4	.18	239
Semi-skilled Labor	2.2	.18	172	2.1	.25	77
Unskilled Labor	3.0	.49	74	1.7	.32	20
"Unemployed"	3.0	.71	36	3.3	1.12	20
Total Group (including unclassified cases)	2.4	.07	1649	2.1	.08	869

* Occupations were classified according to the Institute's modification of the Taussig scale. In 536 cases, occupations were not available in terms specific enough to warrant classification.

[16] Gini, C. Appendix in: Movimento della Popolazione secondo gli Atti dello Stato Civile nell'Anno 1928, Istituto Centrale di Statistica, 1931.

Burks, B. S. A statistical method for estimating the distribution of sizes of completed fraternities in a population represented by a random sampling of individuals. *J. Amer. Statis. Asso.*, 1933, 28, 388-394.

TABLE 4

Estimated Mean Size of Completed Sibship According to Color and Nativity of Parents

COLOR AND NATIVITY	MEAN	σ_m	NO.
White (both parents)	2.4	.07	1462
Non-white (both parents)	2.7	.26	187
Native white (both parents)	2.1	.08	869
Foreign-born white (1 or both parents)	3.0	.17	593
North European countries * (1 or both parents)	2.6	.30	121
Central and South European countries † (1 or both parents)	3.5	.38	218
English speaking countries ‡ (1 or both parents)	2.6	.29	126

* Includes Belgium, Denmark, Finland, Germany, Holland, Norway, Poland, and Sweden.

† Includes Austria, the Balkans, France, Hungary, Italy, Portugal, Spain, and Switzerland.

‡ Includes Australia, Canada, England, Ireland, Isle of Man, Scotland, and Wales.

that the number of first-born individuals in the group be known. Obviously a population containing many large families will contain more offspring of later birth orders than a population containing few large families. It can be shown that the formula for determining the mean size of completed sibships in random fertile families represented by a random sample of offspring is

$$m = \frac{N}{N\,(1)}$$

where m is the mean size; N is the number in the sample; $N(1)$ is the number of first born in the sample.

The fluctuation of m due to sampling error is given by [17]

$$\sigma_m = m\sqrt{m - 1/N}$$

Note that the estimates are for mean size of sibships in *random families,* not for mean size of sibships of random offspring. Means of sibships of random offspring would be distorted by the fact that any

[17] The formula for σ_m was derived by J. R. Oppenheimer, whose assistance we acknowledge with appreciation.

family's chance of being "caught" in a sample of population is proportional to its size. The method which has been here employed corrects for this bias toward larger families. Birth orders of all the children in the Oakland sample (regardless of completeness of sibship) were used for the calculations of Tables 3 and 4.

Most of the differences in family size of the groups classified by occupation, color, and nativity of parents are comparatively small. There is reason, however, for believing that the real differences in fertility of the various occupations are slightly obscured, and that one of the largest differences (native vs. foreign) is partly spurious. If there is a tendency for men in the higher occupational groupings to be older than those in the lower (because of promotion from one occupational level to a higher one), eldest children will be under-represented in the higher groups, and our formula $m = \frac{N}{N(1)}$ will give an estimated mean that is too large in the higher groups, too small in the lower groups. Since the foreign group almost surely contains a disproportionate number of older parents,[18] eldest children will be likewise under-represented, and family size over-estimated. It is possible that such an over-estimation has also occurred for the skilled as compared with the unskilled group.

The low estimated family size of the native white unskilled labor group is out of line with the general trend but the number of cases is small and the standard error high.

4. To define the group of Oakland pupils in terms of the variables measured, means and standard deviations of I.Q. and size of sibship were calculated (Table 5). For comparison, the same statistical constants were also calculated for the stratum of population *represented* by the pupils, i.e. correction was made for the distortion in central tendency and dispersion due to the bias toward large families found in any unselected sample of offspring. (See above for brief discussion.)

The group appears to constitute a random selection with respect to I.Q. It is significant that the criterion of family completeness, "sibs six years or older" gives a slightly higher estimate of size of sibship than "sibs nine years or older"; the estimated ultimate average size of all the sibships is about half a child greater than the present average reached by all sibships in which sibs are six years or older.

[18] The effect of a stable or declining immigration rate is of course to pile up a relatively high proportion of cases in the higher age levels of a foreign-born group.

TABLE 5

Means and S.D.'s of I.Q. and Size of Sibship, Oakland Eighth Grade Pupils

	SIBS 9 YRS. OR OLDER	SIBS 6 YRS. OR OLDER	CALCULATED ESTIMATE FOR ALL CASES *	RESTRICTED AGE GROUP (13-4 to 14-3)
I. Q. (Terman Group Test)				
Mean	100.5	100.6	...	102.1
S. D.	13.7	13.7	...	10.7
No. cases	1140	1328	...	642
Size of completed sibship				
Mean	2.74	2.94	3.33	2.62
S. D.	1.62	1.79	2.02	1.64
No. cases	1139	1328	1603	642
Size of completed sibship corrected for selection toward large families				
Mean	2.00	...	2.35	...
S. D.	1.20	...	1.51	...
No. cases	1139	...	1603	...

* Less 46 cases for which data were incomplete.

The estimated average size of completed sibships in the population represented by the children with "sibs nine years or older" is only 2.00, and in the total population represented by the Oakland children, only 2.35. This latter value is well below the average for fertile families necessary to maintain a stationary population, without immigration. The "equilibrium" figure (according to mortality conditions of 1920) is 3.15 by the calculations of Dublin and Lotka.[19]

Berkeley Group

Correlations were computed for mother's age at first pregnancy and at birth of first living child, primary natal interval, and second natal interval, with: Socio-economic Index, Berkeley Social Rating, family

[19] Dublin, L. I., and Lotka, A. J. On the true rate of natural increase. *J. Amer. Statis. Asso.*, 1925, 20, 305-339.

TABLE 6

Variables Influencing Interval Between Generations Correlated with Socio-economic Variables

	AGE OF MOTHER				NATAL INTERVALS (OF LIVING CHILDREN)			
	At First Pregnancy		At Birth of 1st Living Child		Primary Interval		1st and 2nd Child	
	(P.E.'s of $r = .03$)		(P.E.'s of $r = .03$)		(P.E.'s of $r = \frac{.03}{.04}$)		(P.E.'s of $r = .05$)	
	r	No.	r	No.	r	No.	r	No.
Socio-economic Index	.40	328	.41	340	.22	340	.13	183
Berkeley Social Rating	.36	328	.37	340	.28	340	.17	183
Family Income	.35	324	.36	336	.21	336	.14	182
Occupational Rating (Barr)	.36	316	.36	328	.11	328	.10	180
Education of Father	.25	328	.25	340	.10	340	.05	183
Education of Mother	.34	328	.34	340	.07	340	.04	183
Foreign Birth of Mother*	—.02	328	—.02	340	.02	340	—.10	183

* A positive correlation means that foreign birth was associated with a higher average; a negative correlation the converse. P. E.'s are doubtless somewhat larger for r's in this row than for the Pearsonian r's.

income, Barr Occupational Rating, years of schooling of father, years of schooling of mother, and nativity of mother (two-by-N-fold correlation method).[20] The results are shown in Table 6. Such variables as correlate positively with age of parents—i.e. the first four socio-economic variables of Table 6, which tend to rise as long as earnings show an increment with age—probably yield correlations which are a little exaggerated. Education, which must surely correlate negatively with age because of the large secular increase in secondary school and college enrollment in the United States, probably yields correlations which are a little under-estimated. The fact that the correlations with education do not deviate greatly from the correlations with the first four socio-economic variables suggests that none of these correlations is much in error. The correlations with foreign birth of mother do not vary significantly from zero, a finding which may be spurious and is probably related to the cumulative increase of foreign-born individuals usually found at higher age levels in any random population. (See footnote 18 for discussion of this point.)

It seems fair to conclude that in the Berkeley group there is a higher relationship between socio-economic status and age of founding a family than that obtained in the rural population studied by Conrad and Jones (cf. above). A very low relationship between socio-economic status and natal intervals is found in Berkeley. The extremely low correlations for interval between first and second child may be partly due to the restriction in range of social status consequent upon the selection of families with two or more children.

For purposes of comparison with Oakland, the estimated mean number of children born to completed Berkeley families was calculated by the method already described. Of 402 infants born alive (including 6 twin births), 168 were first born. By the formula $m = \frac{N}{N(1)}$, the mean size of random completed sibships in Berkeley is thus 2.4. This is the same as the mean calculated for the Oakland group, an unanticipated

[20] With nativity of mother a method was used which was developed independently by Tryon (unpublished) and by Richardson and Stalnaker (*J. General Psychol.*, 1933, 8, 463-464). The product-moment formula for the correlation between a dichotomized variable and a continuous variable is, $r = \frac{M_2 - M_1}{\sigma_y} \sqrt{pq}$ where the M's are means of y arrays for the two categories of x, and p and q correspond to proportions of cases in each category of x. This technique has more justification than a biserial correlation for use in our present problem.

result, for the Berkeley birth rate is lower than that in Oakland; moreover, the Berkeley survey children were born about ten years later than the Oakland eighth grade pupils, which in itself should give a disparity in the sizes of the two groups of families because of the secular decrease in birth rate. It seems probable that the estimate of total number of children born to fertile Oakland families is slightly too low; this could be the case if some of the pupils failed through oversight or actual ignorance to report upon deceased siblings.

In the group of white survey families (which constituted the sample contributing data for the present study), the estimated mean size of random completed sibships is 2.3.

To define the Berkeley families in terms of the variables measured, the statistical constants of Table 7 were calculated. The socio-economic variables show relatively high mean values.

TABLE 7

Means and S.D.'s of Fertility Variables and Socio-economic Variables, White Families of Berkeley Survey Group

	MEAN	S.D.	NO.
Age of mother at beginning of first pregnancy	23.8 years	4.2	328
Age of mother at birth of first living child	24.7 years	4.4	340
Primary interval (marriage to birth of first living child)	765 days	582	340
Second natal interval	1130 days	775	183
Socio-economic Index	11.1	3.1	340
Berkeley Social Rating	14.2	3.7	340
Family Income	$2630	1730	336
Occupational Rating (Barr)	11.2	3.5	328
Education of Father	12.1 years	4.1	340
Education of Mother	11.8 years	3.4	340
Nativity of Mother	85.6% nativeborn; 14.4% foreignborn		

SUMMARY AND CONCLUSIONS

Data upon differential fertility have been gathered in two California cities. Both cities have very low birth rates and both stand in a favored position with respect to the socio-economic conditions investigated. Neither of the cities has had for any prolonged period adequate clinical facilities for disseminating information regarding contraception to the mentally, socially, or economically "marginal" strata of the population.

In Oakland the correlation between child's IQ and size of sibship was fully as high as the coefficients usually reported elsewhere; values between —.22 and —.31 were found by various methods of calculation. A differential was also evident when cases were classified according to occupation, color, and nativity of parents. Reversals from the usual findings appeared in the average IQ's of children from one-child and two-child families, and in the average size of sibships estimated for the skilled labor and the semi-skilled labor group, but these reversals were not statistically significant.

In Berkeley correlations of mother's age and natal intervals with socio-economic status tended to be somewhat larger than correlations available for comparison based upon rural New England families.

Though such data as we have been able to present regarding birth control clinics in the two communities obviously touch upon only one type of agency for disseminating contraceptive information, it is at least possible that the extent of a community's clinical facilities furnishes a rough index of the general availability of such information. We have seen that clinical facilities were inferior in Oakland and Berkeley over the period with which we are concerned. The study permits the inference that unless public opinion and concerted community effort result in accessible contraceptive advice for all strata of the population, a falling birth rate may leave the differential unchanged, or may for a time actually increase the differential.

A BIOMETRIC STUDY OF THE ENDOCRINE ORGANS IN RELATION TO MENTAL DISEASE. PART II*

BY RAYMOND PEARL, MARJORIE GOOCH AND WALTER FREEMAN

PARATHYROIDS

TABLE 24 presents the biometric constants for the weights of the parathyroids. While the primary function of the parathyroids is concerned with calcium metabolism, a deficiency of their secretion leads to hyper-excitability of the nervous system and, at the limit of entire absence, to tetany. Some clinicians have regarded parathyroid deficiency as an etiological factor in epilepsy.

It is evident from Table 24 that the parathyroids are extremely variable in weight. In the present material the recorded individual total parathyroid weight (all four glands together) ranges between the extreme limits of 15 and 600 milligrams. The unweighted average coefficient of variation for the 14 groups is 49.79 per cent, indicating an even greater relative variability than that of the thyroid. It is possible that a part of this great scatter of individual values may be connected with the extremely small absolute size of the glands and the consequent difficulties of a uniform technique in their removal and cleaning

*From the Department of Biology of the School of Hygiene and Public Health of The Johns Hopkins University. Two of the authors [R. P. and M. G.] are solely responsible for the analysis and discussion of the data in this paper, and for its writing. The original data were collected by the third author [W. F.] in the course of routine post-mortem examinations, made in the Blackburn Laboratory of St. Elizabeth's Hospital, of persons dying in that institution, where for some years he was Pathologist.

Part I of this study appeared in HUMAN BIOLOGY, Vol. 7, pp. 350-391, 1935, and dealt with the general characteristics of the material; the adrenals and the thyroid.

We are greatly indebted to the Josiah Macy, Jr. Foundation for a grant to the Department of Biology, to aid in the carrying out of this work.

of surrounding tissue before weighing. In this connection it is interesting to note that Roessle and Roulet (*loc. cit.*, p. 73) give as one of the reasons why they did not attempt to determine normal weights for the parathyroid the following statement: "weil die von zufälligen Schwankungen des Blut- und Saftgehaltes abhängigen Unterschiede des Gewichts gegenüber etwa noch zu findenden Korrekturen jener Angaben zu

TABLE 24

Weight of Parathyroids for Different Psychiatric Groups

		CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males	*N*	58	180	197	28
Mean	(mgms.)	150.86± 5.47	158.06± 3.88	144.54± 3.50	151.79± 9.25
Median	(mgms.)	136.54± 6.85	140.00± 4.86	133.20± 4.38	133.34±11.59
S. D.	(mgms.)	61.76± 3.87	77.13± 2.74	72.74± 2.47	72.56± 6.54
C. V.	(%)	40.94± 2.96	48.80± 2.11	50.32± 2.10	47.80± 5.20
Range	(mgms.)	50-360	20-600	25-400	50-300
White Females	*N*	24	80	82	—
Mean	(mgms.)	141.67±12.03	144.38± 4.68	151.22± 4.91	.....
Median	(mgms.)	121.43±15.08	132.26± 5.86	137.88± 6.15	.....
S. D.	(mgms.)	87.40± 8.51	61.99± 3.31	65.90± 3.47	.....
C. V.	(%)	61.69± 7.97	42.94± 2.68	43.58± 2.70	.....
Range	(mgms.)	20-350	30-295	15-300	—
Negro Males	*N*	36	45	146	37
Mean	(mgms.)	168.06± 9.29	178.33± 9.08	159.93± 4.51	177.70±11.52
Median	(mgms.)	150.00±11.64	160.72±11.38	145.37± 5.65	148.08±14.44
S. D.	(mgms.)	82.62± 6.57	90.31± 6.42	80.74± 3.19	103.94± 8.15
C. V.	(%)	49.16± 4.76	50.64± 4.43	50.49± 2.45	58.49± 5.95
Range	(mgms.)	20-400	40-400	20-450	30-500
Negro Females	*N*	31	46	82	—
Mean	(mgms.)	189.52±11.22	191.30±11.09	152.44± 5.12	.....
Median	(mgms.)	156.25±14.06	173.68±13.89	141.38± 6.41	.....
S. D.	(mgms.)	92.63± 7.93	111.46± 7.84	68.68± 3.62	.....
C. V.	(%)	48.88± 5.09	58.27± 5.31	45.06± 2.81	.....
Range	(mgms.)	70-400	20-500	40-400	—

TABLE 25

Relative Parathyroid Weights

RACE AND SEX	RELATIONSHIP	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males—					
a.	Parathyroid weight per cm. of body length.....(mgm.)	0.89	0.92	0.85	0.88
b.	Parathyroid weight per kg. of absolute body weight.....(mgm.)	2.69	2.81	2.93	2.45
c.	Parathyroid weight per kg. of relative body weight.....(mgm.)	45.85	48.04	49.67	42.16
White Females—					
a.	Parathyroid weight per cm. of body length.....(mgm.)	0.91	0.92	0.96	....
b.	Parathyroid weight per kg. of absolute body weight.....(mgm.)	3.27	3.38	3.79	....
c.	Parathyroid weight per kg. of relative body weight.....(mgm.)	51.14	53.28	59.77	....
Negro Males—					
a.	Parathyroid weight per cm. of body length.....(mgm.)	0.99	1.05	0.95	1.04
b.	Parathyroid weight per kg. of absolute body weight.....(mgm.)	2.97	3.05	3.47	3.25
c.	Parathyroid weight per kg. of relative body weight.....(mgm.)	50.62	52.14	58.37	55.36
Negro Females—					
a.	Parathyroid weight per cm. of body length.....(mgm.)	1.18	1.22	0.96	....
b.	Parathyroid weight per kg. of absolute body weight.....(mgm.)	3.56	4.03	3.56	....
c.	Parathyroid weight per kg. of relative body weight.....(mgm.)	56.91	63.14	56.88	....

stark ins Gewicht fallen, nachdem schon bei grösseren Organen, wie die Nebennieren, der beträchtliche Einfluss dieses Umstanden auf die 'Normalzahlen' gezeigt werden wird."

The distribution of the individual variation in weight of the parathyroids is quite clearly skew in the positive direction. In each one of the 14 groups of Table 24 the median is smaller than the mean by amounts frequently of 10 per cent or more. None of these differences between median and mean can be considered statistically significant, because of the large probable errors consequent upon the great variability and relatively small samples, but the trend is clear.

The relative mean weights of the parathyroids, computed on the same plan as for the other endocrine organs, are shown in Table 25.

How do the parathyroid weights in the psychiatric patients of the present sample compare with those in normal persons? Unfortunately data for parathyroid weights are extremely meager. Roessle and Roulet accept and quote the figures of F. Danisch [16] as "vollkommen zuverlässig." This seems a bit extravagant in view of the meagerness of the samples, but even so we can do no better than to follow the lead of Roessle and use the Danisch data for comparative purposes, particularly as there existed in the literature prior to Danisch's paper virtually no data on parathyroid weights, and since that time very few have been added. Furthermore Danisch's work was done with the utmost care and precision, as can be seen from a study of his papers. We have compiled Table 26 by combining the mean weights for the upper and lower pairs together.

There is some doubt as to whether the parathyroid weights quoted from Danisch[16] in Table 26 represent the total weight of parathyroid tissue in the subjects examined or only half of it (i. e., the weight of the parathyroids on one side of the body only). Danisch himself gives no slightest indication in his first paper that the weights as given are *not* for all four parathyroids. In his second paper[18] on pathologically hypertrophied parathyroids he specifically states that the weights as given in that paper *do* include all four glands. Welsh[17] states (p. 382) that "the average weight of the fresh parathyroid in

[16] Danisch, F. Die menschlichen Epithelkörperchen im Senium. I. Mitth. *Frankfurter Zeitschr. f. Pathol.*, Bd. 30, pp. 443-462, 1924.

[17] Welsh, D. A. Concerning the parathyroid glands. A critical, anatomical, and experimental study. Part II, Anatomy. *Jour. Anat. and Physiol.*, Vol. 32, pp. 380-402, 1898. Pl. VII.

TABLE 26

"Normal" Parathyroid Weights (compiled from data of Danisch)

AGE GROUP (*years*)	CASES	WEIGHT OF PARATHYROIDS (*mgm.*)
21-30	8	63
31-40	9	66
41-50	15	71
51-60	10	68
Unweighted means	42	67
60-70 71-80 80 and over	30	70

the adult is about 0.035 grammes," but he in turn does not make it unequivocally clear whether he means this to apply to the *pair* of glands (superior and inferior) *on one side* of the body (in which case the Danisch average of 67 mgm. would be in close agreement with Welsh, on the assumption that Danisch's figures are for total parathyroid tissue, since $2 \times 35 = 70$ mgm.), or whether he means it to apply to just any one of the four glands taken separately (in which case it would mean that Danisch's figures should be doubled, since $4 \times 35 = 140$ mgm. is not far off from $2 \times 67 = 134$ mgm.)

Under the circumstances we feel compelled to treat the Danisch "normal" data in what follows in both ways, namely on the alternative hypotheses that the figures as given represent (a) the total parathyroid weight, and (b) one-half the total weight.

By comparison of Tables 26 and 24 it is at once evident that *the mean absolute parathyroid weights in the present series of psychiatric patients are greater than in Danisch's "normal" adults.* The unweighted mean absolute parathyroid weight for the seven groups of whites in Table 24 (pooling both sexes together) is 148.93 mgm. as compared with the 67 (or 134) mgm. of Danisch.

It seems unlikely that this difference is to be accounted for by differences in technique, because Danisch [18] himself gives in a second paper the weights of the parathyroids of 11 males and 8 females all showing senile osteoporosis, and from these we have computed the mean weights to be for the males 181 mgm., and for the females 155 mgm., and for both sexes pooled 169.99 mgm. These values are plainly not widely divergent from those of Table 24. Furthermore the adequacy of the technique of removal in the present series was checked by sectioning and histological examination.

We therefore seem compelled to conclude that *the mean absolute weight of the parathyroids in the present series of psychiatric patients is higher than in the best series of "normal" non-psychiatric cases available for comparison.* Unfortunately Danisch gives no data from which relative weight of the parathyroids per unit of body weight may be computed.

As between the several *psychiatric groups* in our material there are no significant differences in the mean absolute parathyroid weights, compared pair by pair (of the same race and sex). The probable errors are large. Taking unweighted means for each psychiatric group, and pooling both races and sexes, we have the mean absolute parathyroid weight for cycloids 162.5 mgm.; paranoids 168.0 mgm.; schizoids 152.0 mgm.; epileptoids (males only) 164.7 mgm. These figures suggest that the cycloids, paranoids, and epileptoids stand at about the same level in absolute mean parathyroid weights, while the schizoids are somewhat lower. The highest absolute average (paranoids) is about 111 per cent of the lowest (schizoids). But any conclusion based upon this difference must be extremely tentative because of the high order of magnitude of the probable errors involved.

Examining now the *relative* parathyroid weights of Table 25 it appears that the (unweighted) average parathyroid weights per cm. of body length, for both races and sexes together, are as follows: cycloids 0.99 mgm.; paranoids 1.03 mgm.; schizoids 0.93 mgm. In their general trend these figures parallel those for the absolute averages. But the case is somewhat different when parathyroid weight is taken per kg. of body weight. Then the (unweighted) averages become: cycloids 3.12 mgm.; paranoids 3.32 mgm.; schizoids 3.44 mgm. These figures suggest that the parathyroid equipment per unit of body weight is

[18] Danisch, F. Die menschlichen Epithelkörperchen im Senium. II. Mitth. *Frankfurter Zeitschr. f. Pathol.*, Bd. 32, pp. 188-216, 1925.

slightly *greater* in the schizoids. This result is confirmed by the averages for parathyroid weight per kg. of body weight per 10 cm. of body length. These are as follows: cycloids 51.13 mgm.; paranoids 54.15 mgm.; schizoids 56.17 mgm. But again the necessity for caution must be emphasized, in view of the magnitude of the probable errors.

In respect of *racial comparisons* the Negroes in this material appear to have generally higher mean absolute parathyroid weights than the whites. Taking the unweighted averages for both sexes and the three psychiatric groups cycloids, paranoids, and schizoids we have for whites 148.5 mgm. and for Negroes 173.3 mgm., the latter figure being about 117 per cent of the former. Also the Negro male epileptoids show a higher mean absolute parathyroid weight than the corresponding whites. But just as before caution must be observed about these racial differences because of the large probable errors.

They are, however, confirmed by the *relative* weights of Table 25. The Negroes throughout exhibit higher average parathyroid weights per cm. of body length, per kg. of absolute body weight, and per kg. of relative body weight (kgs. per 10 cm. of body length) except for female schizoids relative to body weights. Taking the last, as the relative figure with the most important biological meaning, we have the following unweighted averages (omitting epileptoids as before): whites 51.29 mgm. of parathyroid for each kg. of weight of the mean 10 cm. cross section of the body; Negroes 56.34 mgm. The latter figure is about 110 per cent of the former.

As between the *sexes* there are no significant differences or regular trends of individually insignificant differences in mean absolute parathyroid weight in this material, but relatively, in respect of both body length and body weight, as shown by the data of Table 25, the females are, on the average, more heavily equipped with parathyroid tissue than the males.

Figure 5 summarizes graphically our results regarding mean parathyroid weight relative to body weight. Unfortunately, as has been pointed out above, there are available no "normal" relative weights for comparison.

This diagram makes plain the tendency towards greater relative parathyroid weights in females and Negroes, and the general lack of striking differentiation between the psychiatric classes in respect of relative parathyroid weights.

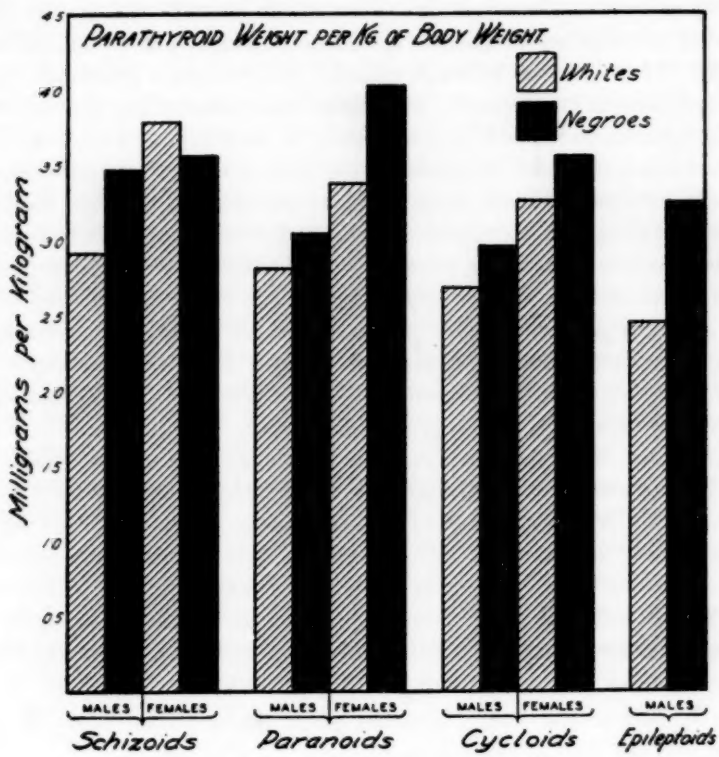


FIG. 5. RELATIVE PARATHYROID WEIGHTS (MEAN) IN PROPORTION TO BODY WEIGHT

The *correlations* of parathyroid weights with body lengths are generally low, with one exception insignificant in comparison with their probable errors, and irregular in sign, as shown in Table 27.

The correlations of parathyroid weight with body weight, as shown in Table 28, are generally slightly higher and more regular as to sign (+) than with body length. Five of the 14 coefficients are probably significant (approximately 3 or more times their probable errors). All but one are positive in sign. But, in general, one can only conclude that, so far as the present material indicates, there is no very marked or definite correlation between the weight of the parathyroids and general body size.

TABLE 27

Values of the Correlation Coefficients (r) Between Parathyroid Weight and Body Length

	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White males	—.088± .089	+.182± .050	+.107± .048	+.263± .127
White females	+.345± .138	—.119± .075	+.006± .074	.....
Negro males	+.173± .112	+.209± .101	—.012± .056	+.192± .111
Negro females	+.032± .121	—.072± .099	—.088± .074	.....

TABLE 28

Values of the Correlation Coefficients (r) Between Parathyroid Weight and Body Weight

	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White males	+.132± .090	+.220± .050	+.256± .049	+.127± .130
White females	+.406± .138	—.044± .075	+.198± .075	.....
Negro males	+.229± .116	+.365± .107	+.126± .056	+.371± .111
Negro females	+.071± .123	+.176± .099	+.113± .074	.....

As has already been indicated above the parathyroids in this material were sectioned and examined as to their histology. From the sections an estimate was made by one of the authors (W. F.) as to the *percentage of active tissue* in the glands, in each individual for a considerable part of all the cases. The data so obtained have been analyzed biometrically, with the results shown in Table 29. It is, of course, to be understood that we are dealing here not with absolute measurements, but with *estimates;* the estimates, however, were all made by one and the same person and according to a uniform standard.

From Table 29 it appears that the epileptoids (males only) show the highest average percentage of active tissue in the parathyroids, with the schizoids coming next. The paranoids have generally the lowest mean percentages of active parathyroid tissue. Putting these results

TABLE 29

Percentages of Active Tissue in Parathyroids

		CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males	*N*	39	130	126	21
Mean	(%)	80.38± 1.58	77.77± 0.94	81.75± 0.91	83.10± 1.48
Median	(%)	83.93± 1.98	80.28± 1.18	85.00± 1.14	84.50± 1.86
S. D.	(%)	14.65± 1.12	15.93± 0.67	15.11± 0.64	10.06± 1.05
C. V.	(%)	18.22± 1.44	20.49± 0.89	18.48± 0.81	12.10± 1.28
White Females	*N*	17	58	53	—
Mean	(%)	72.06± 3.96	75.17± 1.25	76.51± 1.42	.....
Median	(%)	81.00± 4.96	76.84± 1.56	78.75± 1.78	.....
S. D.	(%)	24.20± 2.80	14.08± 0.88	15.34± 1.01	.....
C. V.	(%)	33.58± 4.30	18.73± 1.21	20.06± 1.37	.....
Negro Males	*N*	21	32	99	27
Mean	(%)	79.76± 2.55	73.13± 2.12	81.16± 1.07	85.00± 1.62
Median	(%)	83.89± 3.20	78.00± 2.65	84.83± 1.34	88.34± 2.03
S. D.	(%)	17.35± 1.81	17.75± 1.50	15.81± 0.76	12.47± 1.14
C. V.	(%)	21.76± 2.37	24.28± 2.16	19.48± 0.97	14.67± 1.38
Negro Females	*N*	21	35	62	—
Mean	(%)	75.48± 2.06	74.14± 2.19	77.74± 1.31	.....
Median	(%)	75.00± 2.58	78.33± 2.74	78.82± 1.64	.....
S. D.	(%)	13.97± 1.45	19.18± 1.55	15.26± 0.92	.....
C. V.	(%)	18.50± 2.82	25.87± 2.22	19.63± 1.23	.....

together with those of Table 25 *supra* it is possible to reach the approximate but suggestive unweighted averages that follow, showing the estimated average amount in mgm. of active parathyroid tissue per kg. of weight of the average 10 cm. cross section of the body, in the four psychiatric groups (pooling both races and sexes):

Psychiatric group	*Estimated weight of active parathyroid tissue per kg. of relative body weight*
Cycloids	39.33 mgm.
Paranoids	40.64 mgm.
Schizoids	44.54 mgm.
Epileptoids (Males only)	40.98 mgm.

The schizoids plainly stand out from the other groups with roughly about 10 per cent more active parathyroid tissue in proportion to relative body weight.

Reverting to Table 29 it appears that there are no substantial differences between the races or sexes in respect of percentages of active parathyroid tissue. The distribution of variation in this character is generally negatively skew, the median being larger than the mean.

Summarizing this discussion of the parathyroid glands the striking results achieved appear to be, first, that the psychiatric patients of the present material have parathyroids on the average heavier, and possibly very much heavier, than those recorded for the best comparison series of "normal" weights. We are somewhat skeptical as to whether this result really means what it seems to. But time and accumulation of further data by other workers will presumably resolve the doubt. Amongst the psychiatric groups the schizoids appear to have the largest amount of active parathyroid tissue relative to body weight. The parathyroids are, however, so tiny, the difficulties of removing, cleaning and weighing them accurately are so great, and they vary so widely from individual to individual that we feel strongly that great caution and reserve must be exercised in accepting the *prima facie* results from such small samples as those here dealt with, even though the present material comprises vastly more individual parathyroid weights than have ever before been recorded in any single approximately homogeneous series.

HYPOPHYSIS (PITUITARY GLAND)

It seems odd today to recall that no longer than fifteen years ago it could be said, as it was with some justice, by Camus and Roussy,[18a] that the true physiological function of the hypophysis could be stated only in hypothetical terms. Now some part at least of its rôle in the physiological economy of the organism has been definitely elucidated. There still remains, however, a great deal to be done to establish clearly the part it plays in the determination of human personality, and its relations, if any, to mental disease.

The biometric constants for the weight of the hypophysis in the present material are given in Table 30.

[18a] Camus, J., and G. Roussy. Les fonctions attribuées à l'hypophyse: Étude anatomo-pathologique. *Jour. d. Physiol. et de Pathol. gén.*, T. 20, pp. 535-547, 1922.

TABLE 30

Hypophysis Weight for Different Psychiatric Groups

		CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males	*N*	58	179	201	30
Mean	(mgms.)	687.93±11.25	687.43± 7.27	695.27± 7.41	730.00±24.91
Median	(mgms.)	694.44±14.10	682.08± 9.11	695.00± 9.29	677.78±31.22
S. D.	(mgms.)	127.07± 7.96	144.15± 5.14	155.78± 5.24	202.32±17.62
C. V.	(%)	18.47± 1.20	20.97± 0.78	22.41± 0.79	27.72± 2.59
Range	(mgms.)	350-950	300-1100	300-1300	400-1250
White Females	*N*	24	78	85	—
Mean	(mgms.)	745.83±17.54	803.85±12.27	733.53±10.15	.....
Median	(mgms.)	737.50±21.99	810.53±15.38	744.23±12.72	.....
S. D.	(mgms.)	127.41±12.40	160.68± 8.68	138.77± 7.18	.....
C. V.	(%)	17.08± 1.71	19.99± 1.12	18.92± 1.01	.....
Range	(mgms.)	500-1000	400-1100	300-1000	—
Negro Males	*N*	35	44	141	36
Mean	(mgms.)	772.86±17.04	695.45±16.86	720.21± 8.03	761.11± 2.55
Median	(mgms.)	770.83±21.35	691.67±21.13	698.96±10.06	744.44± 3.20
S. D.	(mgms.)	149.45±12.05	165.77±11.92	141.29± 5.68	172.85± 1.81
C. V.	(%)	19.34± 1.62	23.84± 1.81	19.62± 0.82	22.71± 1.89
Range	(mgms.)	400-1100	350-1100	300-1200	300-1200
Negro Females	*N*	32	45	81	—
Mean	(mgms.)	856.25±27.47	814.44±15.89	820.99±15.20	.....
Median	(mgms.)	769.23±34.43	835.00±19.91	643.18±19.06	.....
S. D.	(mgms.)	230.40±19.43	157.98±11.23	202.89±10.75	.....
C. V.	(%)	26.91± 2.43	19.40± 1.43	24.71± 1.41	.....
Range	(mgms.)	100-1220	350-1040	100-1300	—

In the present material the recorded weight of the hypophysis varies between 100 and 1300 milligrams in the extreme individual cases. The distribution of the individual variation in weight about the mean is generally symmetrical, with no significant skewness, as indicated by the differences between mean and median in the various series.

Relative weights of the hypophysis are set forth in Table 31, on the same plan as used for the other endocrine organs.

TABLE 31

Relative Hypophysis Weights

RACE AND SEX	RELATIONSHIP	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males—					
	a. Hypophysis weight per cm. of body length.....(mgm.)	4.0	4.0	4.1	4.2
	b. Hypophysis weight per kg. of absolute body weight.....(mgm)	12.3	12.2	14.1	11.8
	c. Hypophysis weight per kg. of relative body weight.....(mgm.)	209.1	208.9	238.9	202.8
White Females—					
	a. Hypophysis weight per cm. of body length.....(mgm.)	4.8	5.1	4.6	...
	b. Hypophysis weight per kg. of absolute body weight.....(mgm.)	17.2	18.8	18.4	...
	c. Hypophysis weight per kg. of relative body weight.....(mgm.)	269.3	296.6	289.9	...
Negro Males—					
	a. Hypophysis weight per cm. of body length.....(mgm.)	4.5	4.1	4.3	4.5
	b. Hypophysis weight per kg. of absolute body weight.....(mgm.)	13.7	11.9	15.6	13.9
	c. Hypophysis weight per kg. of relative body weight.....(mgm.)	232.8	203.3	262.9	237.1
Negro Females—					
	a. Hypophysis weight per cm. of body length.....(mgm.)	5.3	5.2	5.1	...
	b. Hypophysis weight per kg. of absolute body weight.....(mgm.)	16.1	17.1	19.2	...
	c. Hypophysis weight per kg. of relative body weight.....(mgm.)	257.1	268.8	306.3	...

Have the psychiatric patients of this material heavier or lighter hypophyses, on the average, than normal adults without mental disease? For comparison here we have chosen the Simmond's series quoted by Roessle and Roulet (*loc. cit.*, p. 74) as being on the whole fairest for the purpose. It is based on 800 weighings. The figures are set forth in Table 32.

TABLE 32

"Normal" Mean Hypophysis Weights (Simmonds)

AGE CLASS	HYPOPHYSIS WEIGHT (*mgm.*)	
	Males	Females
21-30	733	801
31-40	741	814
41-50	687	775
51-60	666	798
61-70	660	754
71-80	697	730
81-90	599	755
Unweighted means	683	775

The (unweighted) average absolute hypophysis weight for white males in this material, from Table 30, taking all psychiatric groups together, is 700 mgm., and that for white females 761 mgm. Plainly there is no evidence here of any significant differentiation of the mentally diseased from the normal in respect of absolute weight of the hypophysis.

Similarly there does not appear from the data of Table 30 any orderly and significant differentiation between the four psychiatric groups in respect of mean absolute weight of the hypophysis. The relative weights of Table 31 suggest the possibility that the hypophysis is a little heavier in proportion to body weight, both absolute and relative, in the schizoids than in the other groups, but this tendency is not entirely regular, and in any case is not large enough to inspire any great confidence in its reality in samples of the size of the present ones.

The mean absolute weight of the hypophysis tends to be greater in the Negroes than in the whites in both sexes and all groups, but the differences are generally not significant in comparison with their probable errors. When the relative weights of Table 31 are examined the racial differences are too small to be impressive of any really significant biological differentiation in respect of proportionate weight of hypophysis.

It is a well-known fact, fully confirmed by the present data, that the hypophysis is heavier in females, especially those who have experienced pregnancy, than in males. This is true for both absolute and relative weights.

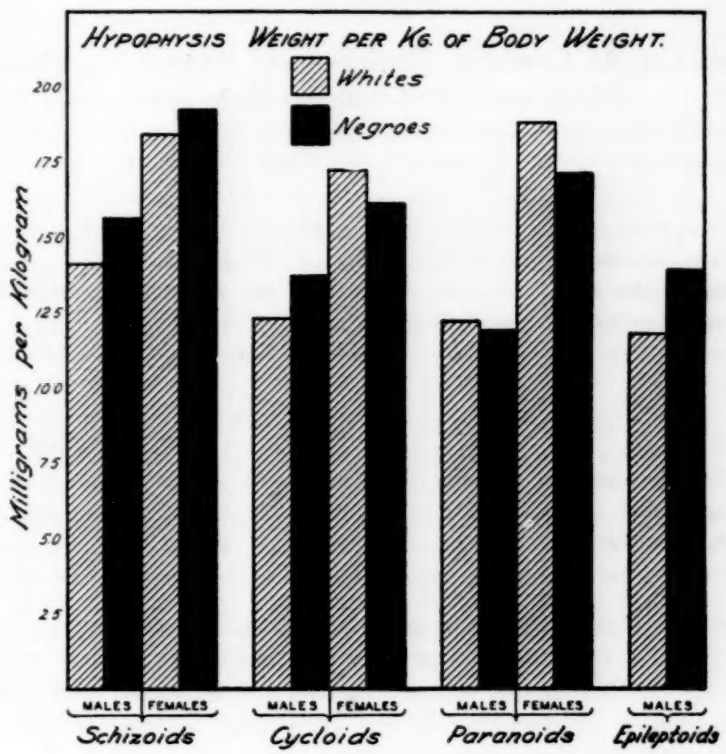


Fig. 6. Relative Hypophysis Weights (Mean) in Proportion to Body Weight

A summary general view of the results to this point regarding mean weights of hypophysis relative to body weight is given in Figure 6. Again, unfortunately, there are no "normal" relative weights available for comparison.

The tendency towards greater mean relative weight of the hypophysis in the females and the Negroes is clearly seen in Fig. 6, as well as the absence of any marked differentiation of the psychiatric classes in respect of this character.

While generally positive in sign the *correlations* of hypophysis weight and body length and body weight are low in amount, as is shown by the data of Table 33.

TABLE 33

Values of the Correlation Coefficients (r) Between Hypophysis Weights and Body Length and Body Weight

BODY LENGTH	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White males	+.097± .088	+.194± .050	+.079± .048	+.372± .123
White females	+.172± .138	+.187± .054	+.150± .073	.....
Negro males	—.115± .114	+.317± .102	+.179± .057	+.102± .112
Negro females	+.260± .119	+.155± .101	+.085± .075	.....
BODY WEIGHT				
White males	+.095± .091	+.249± .051	+.187± .048	+.328± .125
White females	—.029± .138	+.340± .076	+.276± .074	.....
Negro males	+.038± .117	+.141± .107	+.300± .058	+.139± .112
Negro females	+.574± .121	—.107± .101	+.243± .075	.....

Of the 28 coefficients in Table 33 only 12—less than a half—are three or more times as large as their probable errors. While all but three are positive in sign one is generally not impressed with either the magnitude or regularity of the correlation between hypophysis weight and bodily size in this material.

The chief conclusion, as it seems to us, that can be drawn from this study of the hypophysis in the present material, is the generally negative

character of the results. These mentally diseased patients have, on the average, hypophyses of about the same size as "normal" persons, and patients exhibiting different types of psychoses are not significantly differentiated from each other in respect of mean weight of hypophysis.

GONADS

In the basic tables of absolute and relative weights (Tables 34-36 inclusive) we shall put the results for both testes and ovaries into the same tables, in order to save space, but deal with them separately in the

TABLE 34

Weight of Right Gonad for Different Psychiatric Groups

		CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males	*N*	57	182	199	28
Mean	(gms.)	17.24± 0.53	15.22± 0.29	14.36± 0.23	16.21± 0.66
Median	(gms.)	16.41± 0.67	15.25± 0.37	13.90± 0.29	16.00± 0.83
S. D.	(gms.)	5.95± 0.38	5.90± 0.21	4.79± 0.16	5.19± 0.47
C. V.	(%)	34.55± 2.43	38.74± 1.56	33.34± 1.25	32.02± 3.17
Range	(gms.)	4.8-30.5	1.5-37.9	3.7-28.3	6.7-27.8
White Females	*N*	22	67	72	—
Mean	(gms.)	2.05± 0.20	2.08± 0.13	2.18± 0.12	.....
Median	(gms.)	1.86± 0.25	1.68± 0.16	1.73± 0.15	.....
S. D.	(gms.)	1.37± 0.14	1.53± 0.09	1.53± 0.09	.....
C. V.	(%)	67.11± 9.41	73.36± 6.16	69.98± 5.53	.....
Range	(gms.)	0.3-5.0	0.1-8.5	0.5-6.2	—
Negro Males	*N*	36	44	140	36
Mean	(gms.)	13.67± 0.54	14.52± 0.45	11.57± 0.23	14.17± 0.61
Median	(gms.)	13.31± 0.68	14.40± 0.57	10.96± 0.28	13.53± 0.76
S. D.	(gms.)	4.81± 0.38	4.47± 0.32	3.96± 0.16	5.40± 0.43
C. V.	(%)	35.18± 3.12	30.81± 2.42	34.24± 1.53	38.12± 3.56
Range	(gms.)	5.7-28.5	5.79±29.0	2.9-26.4	1.7-31.0
Negro Females	*N*	24	35	59	—
Mean	(gms.)	2.33± 0.19	2.36± 0.16	2.72± 0.15	.....
Median	(gms.)	2.00± 0.24	2.13± 0.21	2.17± 0.19	.....
S. D.	(gms.)	1.40± 0.14	1.44± 0.12	1.74± 0.11	.....
C. V.	(%)	60.19± 7.69	61.12± 6.51	63.87± 5.34	.....
Range	(gms.)	0.5-6.1	0.7-8.1	0.4-8.1	—

subsequent discussion. Tables 34 and 35 give the biometric constants for absolute weights, and for right and left gonads separately. Table 36 gives the relative weights, on the same plan as before, for total gonad weights (right and left).

TABLE 35

Weight of Left Gonad for Different Psychiatric Groups

		CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males	*N*	57	181	200	28
Mean	(gms.)	16.62± 0.54	14.21± 0.28	13.73± 0.22	15.57± 0.60
Median	(gms.)	16.32± 0.67	14.41± 0.35	13.37± 0.28	15.44± 0.75
S. D.	(gms.)	6.01± 0.38	5.55± 0.20	4.62± 0.16	4.69± 0.42
C. V.	(%)	36.13± 2.56	39.03± 1.58	33.68± 1.26	30.09± 2.95
Range	(gms.)	2.6-28.7	1.1-30.3	3.6-25.8	6.5-30.0
White Females	*N*	19	63	71	—
Mean	(gms.)	1.87± 0.14	1.83± 0.10	2.12± 0.12	.....
Median	(gms.)	1.68± 0.18	1.60± 0.13	1.73± 0.15	.....
S. D.	(gms.)	0.93± 0.10	1.18± 0.07	1.46± 0.08	.....
C. V.	(%)	49.76± 6.66	64.47± 5.24	68.74± 5.43	.....
Range	(gms.)	0.5-4.0	0.4-7.5	0.4-7.6	—
Negro Males	*N*	37	45	140	36
Mean	(gms.)	13.49± 0.58	14.50± 0.45	11.81± 0.25	13.06± 0.59
Median	(gms.)	13.18± 0.72	14.39± 0.56	11.13± 0.31	12.63± 0.74
S. D.	(gms.)	5.21± 0.41	4.47± 0.32	4.32± 0.17	5.24± 0.42
C. V.	(%)	38.61± 3.45	30.84± 2.39	36.60± 1.66	40.14± 3.82
Range	(gms.)	6.5-30.3	4.1-28.3	3.2-30.2	2.9-28.5
Negro Females	*N*	24	33	56	—
Mean	(gms.)	1.75± 0.13	2.11± 0.13	2.63± 0.14	.....
Median	(gms.)	1.50± 0.16	1.79± 0.16	2.25± 0.18	.....
S. D.	(gms.)	0.91± 0.09	1.10± 0.09	1.56± 0.10	.....
C. V.	(%)	52.16± 6.31	52.20± 5.39	59.39± 4.94	.....
Range	(gms.)	0.5-4.6	0.6-4.9	0.4-7.5	—

TABLE 36

Relative Total Mean Weights of Gonads, Right and Left Together

RACE AND SEX	RELATIONSHIP	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males—					
	a. Testes weight per cm. of body length.....(mgm.)	199	172	165	185
	b. Testes weight per kg. of absolute body weight.....(mgm.)	605	524	569	513
	c. Testes weight per kg. of relative body weight.....(mgm.)	10292	8945	9653	8828
White Females—					
	a. Ovary weight per cm. of body length.....(mgm.)	25	25	27	....
	b. Ovary weight per kg. of absolute body weight.....(mgm.)	90	92	108	....
	c. Ovary weight per kg. of relative body weight.....(mgm.)	1415	1443	1700	....
Negro Males—					
	a. Testes weight per cm. of body length.....(mgm.)	159	170	139	160
	b. Testes weight per kg. of absolute body weight.....(mgm.)	481	497	507	497
	c. Testes weight per kg. of relative body weight.....(mgm.)	8181	8485	8533	8483
Negro Females—					
	a. Ovary weight per cm. of body length.....(mgm.)	25	29	34	....
	b. Ovary weight per kg. of absolute body weight.....(mgm.)	77	94	125	....
	c. Ovary weight per kg. of relative body weight.....(mgm.)	1225	1475	1996	....

Testes

In spite of the fact that the testis is an organ easy to remove and to weigh with accuracy it shows a relatively high degree of variation in weight, however the variation is measured, in this material. The recorded weights of individual testes vary between the extremes of 1.1 and 37.9 gm. The coefficients of variation for this character range between about 30 and 40 per cent, with an (unweighted) average value of the 16 coefficients of 35.13 percent. Generally the Negroes tend, in this material, to show greater relative variability in testis weight than the whites, but not by statistically significant amounts.

Table 37 gives, for this material, the mean weights of right and left testes combined.

TABLE 37

Mean Total Weight of Testes in Gm.

GROUP	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White males	33.86	29.43	28.09	31.78
Negro males	27.16	29.02	23.38	27.23

For comparison with the figures of Table 37 the following data (Table 38) for "normals" are quoted from Roessle and Roulet (*loc. cit.*, p. 85).

It is evident that the absolute mean weight of the testes tends to be slightly smaller in this material from the mentally diseased whites than in the "normal" adult comparison series, and still smaller in the Negroes. But the difference, in the case of the whites, is not of an order of magnitude to lead one to suppose that it probably has any profound biological significance.

As between the several psychiatric groups it appears that there are some significant differences in mean weight of the testes, both absolutely and relative to bodily dimensions. It will therefore be desirable to analyze the situation in detail. In the whites the cycloids show the highest mean absolute weight and the schizoids the lowest, for both the right and left testis. The difference in the case of the right testis

TABLE 38

Mean "Normal" Testes Weights (Roessle and Roulet)

AGE GROUP	*N*	MEAN WEIGHT (*grams*)
21-25	166	33.12± .69
26-30	106	34.10± .81
31-40	169	37.70± .93
41-50	113	36.56± .91
51-60	36	33.84±1.80
61-70	19	37.44±2.57
71-80	10	33.62±1.72
81-90	4	32.67
Unweighted averages ...	623	34.88

amounts to 2.88 ± .58 gm., the difference being thus 4.9 times its probable error, and therefore significant. For the left testis the difference between the means of the same two groups is 2.89 ± .58 gm., or 5.0 times its probable error. Put in another way the absolute mean right testis weight for the white cycloids is 120.1 per cent of that for the schizoids. The corresponding percentage for the left testis is 121.0. And it is to be noted that the schizoids have a lower mean age than the cycloids (cf. Table 2 *supra*), so that senile involution can scarcely play any significant rôle in producing this result. In the Negroes the paranoids show the highest absolute mean weight of testis on both right and left side, and the schizoids again the lowest. Here the differences between the extreme groups are: for the right testis 2.95 ± .51 gm., and for the left 2.69 ± .51 gm. There are other significant differences between the psychiatric groups in mean absolute weight of testes. In the whites the mean for the cycloids is greater by 2.02 ± .60 gm. for the right testis, and 2.41 ± .61 gm. for the left testis, than the corresponding means for the paranoids, both of these being statistically significant differences. In the Negroes the mean for the right testis in the epileptoids is greater than that for the schizoids by 2.60 ± .65 gm., a statistically significant amount, but the corresponding difference for the left testis is less than three times its probable error. For the whites the mean weight of the testes per cm. of

body length is greatest in the cycloids and least in the schizoids, the former value being about 122 per cent of the latter. Per kg. of body weight, either absolute or relative, the mean testis weight is highest in the cycloids among the whites, and in the schizoids among the Negroes.

It is a striking and somewhat unexpected fact that in this material the mean testis weights, both absolute and relative to body length and body weight are *smaller* in the Negroes than in the whites. Taking (unweighted) averages for all psychiatric groups the white means are the following percentages of the Negro means:

For absolute weight of right testis	116.8 per cent
For absolute weight of left testis	113.8 per cent
For weight of both testes per cm. of body length	114.8 per cent
For weight of both testes per kg. of absolute body weight	111.6 per cent
For weight of both testes per kg. of relative body weight	112.0 per cent

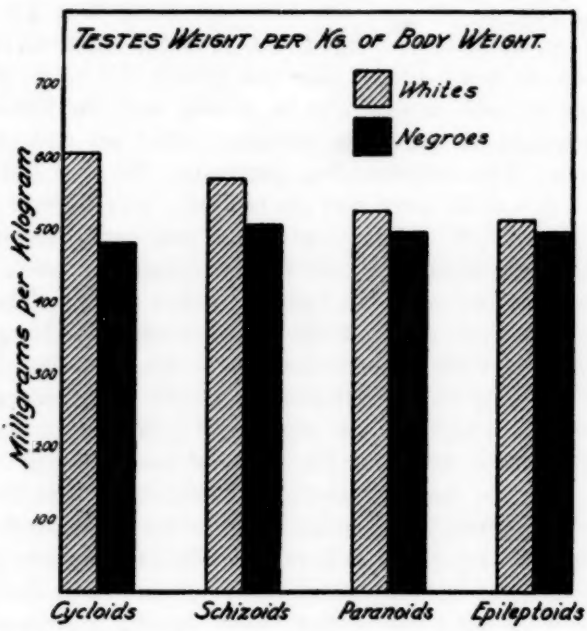


Fig. 7. Relative Weights of the Testes (Mean) in Proportion to Body Weight

On the question of *symmetry* it appears that in this material the mean weight of the *right testis is greater* than that of the left in 7 of the 8 comparable groups. The Negro schizoids form the exception.

The general picture of the situation regarding the weight of the testes relative to body weight is shown graphically in Fig. 7.

The *correlations* of testis weight with body length and body weight are shown in Table 39.

TABLE 39

Values of the Correlation Coefficient (r) Between Testis Weight and Body Length and Body Weight

GROUP	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
Body Length—Right Testis				
White males	—.023± .089	+.158± .050	+.146± .034	+.369± .127
Negro males	+.355± .112	+.271± .102	+.102± .057	+.325± .112
Body Length—Left Testis				
White males	—.010± .089	+.164± .050	+.040± .048	+.455± .127
Negro males	+.315± .111	+.153± .101	—.005± .057	+.228± .112
Body Weight—Right Testis				
White males	+.179± .091	+.269± .050	+.459± .048	+.648± .130
Negro males	+.214± .116	+.457± .107	+.253± .058	+.525± .112
Body Weight—Left Testis				
White males	+.298± .091	+.182± .051	+.365± .048	+.495± .130
Negro males	+.180± .114	+.294± .107	+.217± .058	+.338± .112

Of the 32 correlations of Table 39 all but 3 are positive in sign. But the magnitude of the coefficients varies widely. This is most clearly shown by Table 40 which gives the distribution of the values of r.

It is evident that the weight of the testes tends to be generally more highly correlated with body weight than with body length.

Summarizing the case relative to the testes the most significant results are, first, the generally lower weight of the testes in this sample of mentally diseased persons than in the "normal"; and, second, the generally lower average weight of the testes in the Negroes as compared with the whites.

TABLE 40

Distributions of the Correlation Coefficients for Correlations of Weight of Testes With Body Length and Weight

VALUES OF r	WITH BODY LENGTH	WITH BODY WEIGHT
—.09- 0	3	..
0-+.09	1	..
+.10- .19	5	3
+.20- .29	2	6
+.30- .39	4	2
+.40- .49	1	3
+.50- .59	..	1
+.60- .69	..	1
	16	16

Ovaries

The ovaries are much more variable in weight, so far as the present material indicates, than either the testes or any other organ of internal secretion. The extreme recorded range of the individual variation is from 0.1 gm. to 8.5 gm. The coefficients of variation generally fall in the 50's and 60's. This is partly accounted for by the fact that our material includes women dying after the menopause, as well as those dying before it. Adult ovary weights should be separately discussed for these two groups, but the present material is unfortunately too meager to warrant this further split.

Table 41 gives, for our material, the mean weights of right and left ovaries combined.

TABLE 41

Mean Total Weight of Ovaries in Gm.

GROUP	CYCLOIDS	PARANOIDS	SCHIZOIDS
White females	3.92	3.91	4.30
Negro females	4.08	4.47	5.35

For comparison with the figures of Table 41 there is inserted Table 42, quoted from Roessle and Roulet (*loc. cit.*, p. 88), the relative weights of the last column being our computations.

TABLE 42

Mean "Normal" Ovary Weights (Roessle and Roulet)

AGE GROUP (*yrs.*)	*N*	MEAN ABSOLUTE WEIGHT (*gm.*)	MEAN RELATIVE WEIGHT (*mgm. per kg.*)
21-30	91	11.30± .47	251
31-40	88	10.66± .52	231
41-50	85	7.52± .35	153
51-60	87	5.03± .67	108
61-70	83	4.13± .57	86
71-90	54	4.09± .64	93
Unweighted means..	488	7.12	154

Considering the high average age at death in the present material there is good general agreement with the "normal" post-menopausal figures. But even making allowance for the high percentage of involutional cases, it is probable that the ovary weights in the whites of the present material tend to be smaller than in "normals."

As between the several psychiatric groups there are but few even possibly significant differences in mean absolute weight of ovaries. In weight of ovaries per kg. of body weight, as shown graphically in Fig. 8, the schizoids stand highest and the cycloids lowest.

The mean absolute weights of the ovaries are in every case but one (left ovary in cycloids) higher in the Negroes than in the whites in this material, but by only small amounts. The same is true of ovary weight relative to body weight in the schizoids and paranoids, but not in the cycloids.

On the question of *symmetry* it appears that the mean absolute weight of the right ovary is greater than that of the left in every group, but usually by only a small amount.

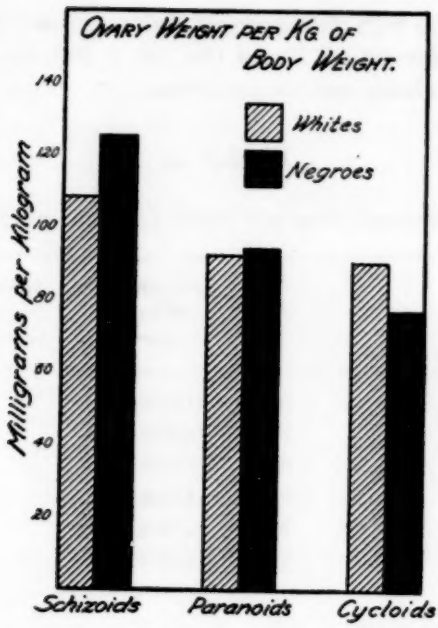


FIG. 8. RELATIVE WEIGHTS OF OVARIES (MEAN) IN PROPORTION TO BODY WEIGHT

TABLE 43

Values of the Correlation Coefficient (r) Between Ovary Weight and Body Length and Body Weight

GROUP	CYCLOIDS	PARANOIDS	SCHIZOIDS
Body length—Right ovary			
White females	+.248± .144	+.033± .082	+.167± .079
Negro females	+.353± .138	+.106± .114	+.068± .088
Body length—Left ovary			
White females	+.364± .155	+.156± .085	+.267± .080
Negro females	+.403± .138	—.091± .117	+.114± .090
Body weight—Right ovary			
White females	+.639± .144	+.175± .083	+.091± .081
Negro females	+.323± .141	+.096± .112	—.040± .087
Body weight—Left ovary			
White females	+.661± .155	+.059± .085	+.126± .081
Negro females	+.121± .141	—.140± .116	+.132± .089

The *correlations* between ovary weight and body length and body weight are shown in Table 43.

Three of the 24 coefficients of Table 43 are negative in sign. Generally the ovary correlations are very irregular in their values, again probably in part due to age heterogeneity. The relatively high numerical values of the coefficients in the cycloids is striking, but considering the probable errors probably means little.

EPIPHYSIS (GLANDULA PINEALIS)

Physiologists are by no means agreed as to the endocrinal functions, if any, of the epiphysis. But it is the present fashion to include this organ in discussions of the endocrines, and we follow the mode.

Tables 44 and 45 show the biometric constants, and the relative values of the means, for the weight of the epiphysis on the same plan as for the other organs discussed.

The high relative variability that has been seen in all the other endocrine organs is reflected again in the epiphysis weights. The recorded weights of this organ vary in this material from 6 to 650 mgm. The coefficients of variation are all well over 40 per cent. The distributions tend to be skew, as indicated by the values of means and medians, but these differences are not statistically significant.

The absolute mean weights of the epiphysis in the present material seem generally to be not essentially different from those found in "normal" persons, as indicated by comparing Table 46 (Berblinger's data) with Table 44. But there is one marked difference between our figures and Berblinger's. In the present material the mean weight of the epiphysis tends definitely to be greater in the females than in the males, both absolutely and relatively, whereas his data give equal average values to both sexes. It is however to be noted that his means for ages over 51 years show higher values in the females than in the males.

As between the several psychiatric groups there appear no very marked, regular, or significant differences in epiphysis weights, either absolute or relative to body size.

The mean weights of the epiphysis, both absolute and relative, are regularly smaller in the Negro groups than in the whites. This probably represents a true biological difference between the races. The mean relative weights of the epiphysis are shown graphically in Fig. 9.

TABLE 44

Weight of Epiphysis for Different Psychiatric Groups

		CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males	*N*	58	170	197	29
Mean	(mgms.)	168.97± 6.73	180.29± 4.82	167.13± 2.34	181.90±13.33
Median	(mgms.)	150.00± 8.44	154.41± 6.04	144.07± 2.93	147.22±16.71
S. D.	(mgms.)	76.04± 4.76	93.16± 3.41	81.24± 1.65	106.45± 9.43
C. V.	(%)	45.01± 3.34	51.67± 2.34	48.61± 2.00	58.52± 6.73
Range	(mgms.)	50-400	20-500	20-600	40-450
White Females	*N*	24	81	81	—
Mean	(mgms.)	170.83±10.12	191.67± 7.02	180.56± 5.80	.....
Median	(mgms.)	150.00±12.68	182.81± 8.79	166.25± 7.27	.....
S. D.	(mgms.)	73.48± 7.15	93.62± 4.96	77.38± 4.10	.....
C. V.	(%)	43.01± 4.92	48.85± 3.15	42.86± 2.66	.....
Range	(mgms.)	6-320	60-550	40-360	—
Negro Males	*N*	37	39	141	34
Mean	(mgms.)	166.89± 8.20	132.69± 6.87	150.89± 4.92	134.76± 7.02
Median	(mgms.)	148.21±10.28	122.06± 8.61	130.50± 6.17	128.57± 8.80
S. D.	(mgms.)	73.99± 5.80	63.59± 4.86	86.63± 3.48	60.71± 4.97
C. V.	(%)	44.34± 4.10	47.92± 4.42	57.41± 2.97	44.39± 4.29
Range	(mgms.)	50-400	40-300	30-570	30-300
Negro Females	*N*	33	46	76	—
Mean	(mgms.)	170.45±12.71	159.78± 8.16	155.26± 7.93	.....
Median	(mgms.)	142.50±15.93	145.46±10.22	142.50± 9.94	.....
S. D.	(mgms.)	108.27± 8.99	82.01± 5.77	102.46± 5.61	.....
C. V.	(%)	63.52± 7.09	51.32± 4.46	65.99± 4.94	.....
Range	(mgms.)	10-500	40-400	20-650	—

TABLE 45

Relative Mean Weights of the Epiphysis

RACE AND SEX	RELATIONSHIP	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males—					
	a. Epiphysis weight per cm. of body length.....(mgm.)	0.99	1.05	0.98	1.06
	b. Epiphysis weight per kg. of absolute body weight.....(mgm.)	3.02	3.21	3.38	2.93
	c. Epiphysis weight per kg. of relative body weight.....(mgm.)	51.4	54.8	57.4	50.5
White Females—					
	a. Epiphysis weight per cm. of body length.....(mgm.)	1.09	1.22	1.14	....
	b. Epiphysis weight per kg. of absolute body weight.....(mgm.)	3.94	4.49	4.52	....
	c. Epiphysis weight per kg. of relative body weight.....(mgm.)	61.7	70.7	71.4	....
Negro Males—					
	a. Epiphysis weight per cm. of body length.....(mgm.)	0.98	0.78	0.90	0.80
	b. Epiphysis weight per kg. of absolute body weight.....(mgm.)	2.95	2.27	3.28	2.50
	c. Epiphysis weight per kg. of relative body weight.....(mgm.)	50.3	38.8	55.1	42.6
Negro Females—					
	a. Epiphysis weight per cm. of body length.....(mgm.)	1.06	1.02	0.97	....
	b. Epiphysis weight per kg. of absolute body weight.....(mgm.)	3.20	3.36	3.63	....
	c. Epiphysis weight per kg. of relative body weight.....(mgm.)	51.2	52.7	57.9	....

TABLE 46

Mean "Normal" Epiphysis Weights (in mgm.)—Berblinger's Data Quoted From Roessle and Roulet

AGE (*yrs.*)	MALES	FEMALES
21-30	166	158
31-40	203	175
41-50	178	101
51-60	162	214
61-70	147	200
71-80	116	123
Unweighted means	162	162

TABLE 47

Values of the Correlation Coefficients (r) Between Epiphysis Weight and Body Length and Body Weight

	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
With Body Length				
White males	+.156± .089	+.051± .052	+.149± .048	+.378± .125
White females	—.169± .138	—.020± .075	+.089± .075	.....
Negro males	—.202± .111	—.027± .108	+.053± .057	+.154± .116
Negro females	+.040± .117	+.033± .099	+.128± .077	.....
With Body Weight				
White males	+.139± .090	+.139± .052	+.094± .049	+.411± .127
White females	+.054± .138	+.107± .075	+.256± .076	.....
Negro males	+.137± .114	—.145± .116	+.112± .058	+.043± .116
Negro females	—.117± .119	—.288± .099	—.090± .077	.....

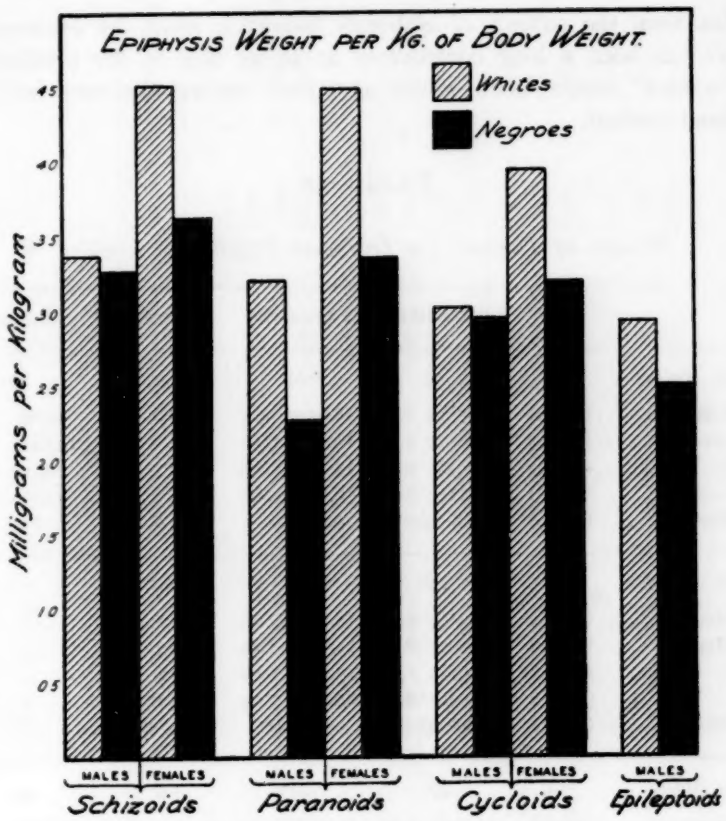


FIG. 9. RELATIVE EPIPHYSIS WEIGHTS (MEAN) IN PROPORTION TO BODY WEIGHT

The *correlations* of epiphysis weight with body length and weight are set forth in Table 47.

It is plain from Table 47 that the correlation of epiphysis weight with body size is generally low and irregular. It may be safely concluded that the present material gives no evidence that the size of the body as a whole and the size of the pineal gland are really correlated in their variation at all.

THYMUS

The thymus is a gland of great importance in early life, and normally undergoes progressive involution with advancing age after childhood.

It has been the subject of elaborate biometric study by Hammar.[19] There has been a long controversy as to its rôle in the production of "sudden" deaths, about which agreement among clinicians has not yet been reached.

TABLE 48

Weight of Thymus for Different Psychiatric Groups

		CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males	*N*	59	181	193	29
Mean .....(gms.)		19.75± 1.18	18.65± 0.71	17.02± 0.74	16.29± 1.12
Median .....(gms.)		16.88± 1.48	16.02± 0.89	13.71± 0.92	14.64± 1.41
S. D. .....(gms.)		13.45± 0.84	14.18± 0.50	15.15± 0.52	8.97± 0.79
C. V. .....(%)		68.11± 5.87	76.05± 3.96	89.02± 4.91	55.05± 6.18
Range .....(gms.)		0.8-75.0	0.97-90.0	1.2-80.0	3-37
White Females	*N*	26	79	85	—
Mean .....(gms.)		17.31± 1.72	18.16± 1.16	11.97± 0.71	.....
Median .....(gms.)		16.00± 2.15	15.00± 1.46	9.50± 0.88	.....
S. D. .....(gms.)		12.97± 1.21	15.31± 0.82	9.64± 0.50	.....
C. V. .....(%)		74.94±10.21	84.27± 7.03	80.54± 6.32	.....
Range .....(gms.)		2.0-43.5	1.7-80.0	0.7-48.0	—
Negro Males	*N*	37	42	147	35
Mean .....(gms.)		14.39± 1.29	15.17± 1.33	10.29± 0.40	13.79± 1.34
Median .....(gms.)		12.05± 1.62	12.12± 1.67	8.59± 0.50	10.42± 1.69
S. D. .....(gms.)		11.65± 0.91	12.80± 0.94	7.12± 0.28	11.79± 0.95
C. V. .....(%)		80.91± 9.64	84.41± 9.67	69.22± 3.81	85.54±10.82
Range .....(gms.)		2.2-50.0	1.3-73.0	1.2-43.0	2.0-45.5
Negro Females	*N*	30	47	76	—
Mean .....(gms.)		14.67± 1.21	12.18± 0.85	10.99± 0.54	.....
Median .....(gms.)		12.22± 1.51	10.58± 1.07	8.65± 0.68	.....
S. D. .....(gms.)		9.81± 0.85	8.65± 0.60	7.03± 0.38	.....
C. V. .....(%)		66.85± 8.01	71.05± 7.01	63.94± 4.72	.....
Range .....(gms.)		1.35-41.00	0.98-37.5	1.5 -45.0	—

[19] Hammar, J. A. Die Menschen-thymus. *Leipzig* (Akad. Verlags-Ges.), 1926. In this volume earlier studies are summarized.

TABLE 49

Mean Relative Weights of the Thymus

RACE AND SEX	RELATIONSHIP	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males—					
a.	Thymus weight per cm. of body length.....(mgm.)	116	109	100	95
b.	Thymus weight per kg. of absolute body weight.....(mgm.)	353	332	345	263
c.	Thymus weight per kg. of relative body weight.....(mgm.)	6003	5669	5849	4525
White Females—					
a.	Thymus weight per cm. of body length.....(mgm.)	111	115	76	....
b.	Thymus weight per kg. of absolute body weight.....(mgm.)	399	426	300	....
c.	Thymus weight per kg. of relative body weight.....(mgm.)	6249	6701	4731	....
Negro Males—					
a.	Thymus weight per cm. of body length.....(mgm.)	84	89	61	81
b.	Thymus weight per kg. of absolute body weight.....(mgm.)	255	260	223	252
c.	Thymus weight per kg. of relative body weight.....(mgm.)	4334	4436	3755	4296
Negro Females—					
a.	Thymus weight per cm. of body length.....(mgm.)	92	78	69	....
b.	Thymus weight per kg. of absolute body weight.....(mgm.)	275	256	257	....
c.	Thymus weight per kg. of relative body weight.....(mgm.)	4405	4020	4101	....

The biometric constants for the absolute weight of this organ in our material are given in Table 48, and the relative values of the means in Table 49.

As is to be expected in the case of an involuting organ, the weight of the thymus is highly variable. The extremes of weight recorded for individual glands are 0.7 and 90 gms. The coefficients of variation exhibit high values, in fact generally the highest observed in this study. As will be seen later this extremely high relative variability is also reflected in the percentages of active tissue in the glands.

As compared with "normal" individuals (using Roessle and Roulet's data *loc. cit.*, p. 82, for comparison) the mentally diseased individuals of the present material show generally larger mean thymus weights, both absolute and relative to body weight, as will appear from comparison of Table 50 with Tables 48 and 49. Taking (unweighted) averages of the means of Table 49 for whites it appears that the mass "dosage" of thymus in mgm. per kg. of body weight is about 145 per cent of the Roessle-Roulet figures for white males, and 143 per cent for white females. It is further to be noted that this result appears in spite of the fact that the average age of our material is much higher than that of Table 50, and the thymus normally decreases in weight with advancing age.

TABLE 50

Mean Absolute "Normal" Thymus Weights (in gms.) (Roessle and Roulet), and Relative Weights per Kg. of Body Weight Computed From the Same Data

AGE (*yrs.*)	MALES		FEMALES	
	Absolute (*gm.*)	Per kg. in body weight (*mgm.*)	Absolute (*gm.*)	Per kg. in body weight (*mgm.*)
21-25	15.72	274	11.33	284
26-35	14.08	234	9.0	...
36-45	9.91	162	12.5	239
Unweighted means	13.24	223	10.94	262

Comparing the different psychiatric groups in the present material (Tables 48 and 49 and Fig. 10) it appears that there are no very striking or regular differences in thymus weight, either absolute or relative to body size. There seems to be some tendency for the epileptoids to have low mean thymus weights, in spite of their relatively younger age, but, in general, no strong case can be made from this material for a particularly high or low thymus weight being characteristic of any single psychiatric group.

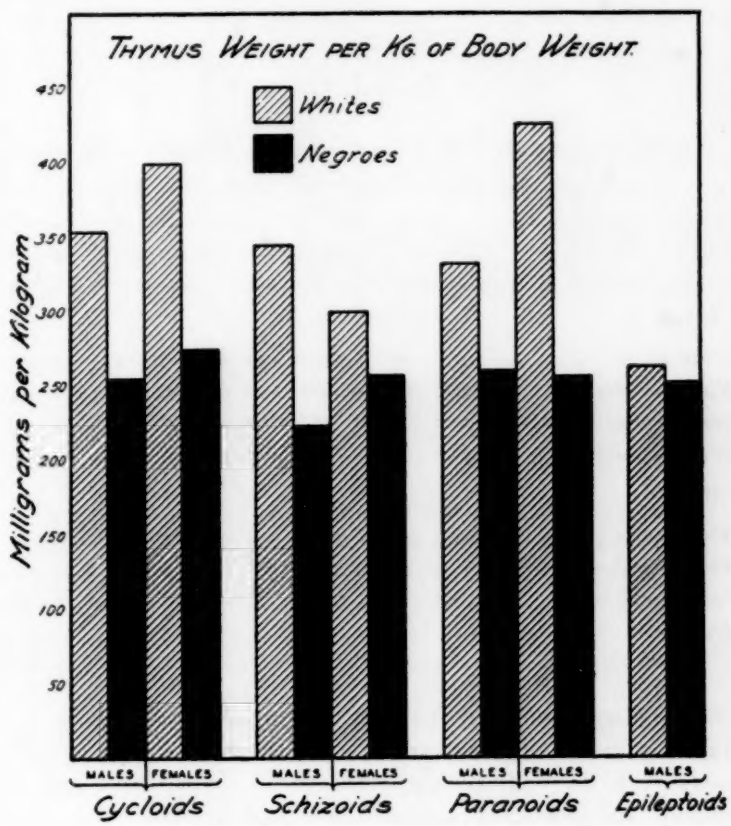


FIG. 10. RELATIVE WEIGHT OF THE THYMUS (MEAN) IN PROPORTION TO BODY WEIGHT

The low absolute and relative weights of the thymus in the Negroes as compared with the whites is striking. Taking averages (unweighted) it appears that the mean number of mgm. of thymus per kg. of body weight is, in the Negroes, only 79 per cent of what it is in the whites, in the case of males, and 70 per cent in the case of females. This is a large deficiency.

As between the sexes the thymus tends generally to be heavier relatively (i.e. in proportion to body weight) in the females than in the males, though lighter absolutely.

The *correlations* of thymus weight with body length and body weight are set forth in Table 51.

TABLE 51

Values of the Correlation Coefficient (r) Between Thymus Weight and Body Length and Body Weight

	CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
Body Length				
White males	+.103± .088	+.062± .050	+.129± .049	+.063± .125
White females	+.138± .132	+.202± .076	+.294± .073	.....
Negro males	+.031± .111	—.002± .104	—.051± .056	—.071± .114
Negro females	—.149± .123	+.111± .098	+.091± .077	.....
Body Weight				
White males	+.349± .089	+.323± .051	+.621± .049	+.167± .127
White females	+.536± .132	+.439± .076	+.627± .074	.....
Negro males	+.372± .114	+.651± .111	+.701± .056	+.321± .11
Negro females	+.405± .125	+.440± .098	+.447± .077	.....

The striking feature of Table 51 is the great difference in the general magnitudes of the thymus correlations with body length as compared with the body weight correlations. With body length the correlations are practically zero and irregular in sign. The correlations of thymus weight with body weight, on the other hand, are all positive in sign and the highest observed for any endocrine organ, taken as a whole.

After fixation and sectioning an estimate was made from microscopic examination of the sections regarding the *percentage of active glandular tissue* in a considerable number of thymus glands. While these estimates cannot be regarded as measurements, they were all made by one and the same person [W. F.] by a uniform technique, and therefore seem worthy of biometric treatment, as a rough index of the extent to which involution of the gland has proceeded in the several psychiatric groups. The biometric constants are presented in Table 52.

TABLE 52

Percentage of Active Glandular Tissue in Thymus by Psychiatric Groups

		CYCLOIDS	PARANOIDS	SCHIZOIDS	EPILEPTOIDS
White Males	*N*	35	125	128	25
Mean		6.07± 0.78	6.20± 0.70	9.96± 0.65	15.10± 1.69
Median		3.98± 0.98	3.29± 0.87	5.86± 0.81	12.50± 2.11
S. D.		6.87± 0.55	11.55± 0.49	10.86± 0.46	10.99± 1.19
C. V.		113.21±17.23	186.36±22.41	109.04± 8.45	72.77± 9.96
White Females	*N*	16	59	56	—
Mean		5.47± 1.32	4.99± 0.56	8.48± 1.22	.....
Median		3.64± 1.65	3.21± 0.71	4.12± 1.52	.....
S. D.		7.82± 0.93	6.42± 0.40	13.49± 0.86	.....
C. V.		142.94±38.44	128.69±16.59	158.98±22.78	.....
Negro Males	*N*	22	28	102	32
Mean		17.27± 3.12	12.41± 2.01	15.54± 1.06	30.31± 3.27
Median		11.43± 3.91	6.43± 2.52	10.50± 1.33	21.11± 4.09
S. D.		21.69± 2.21	15.79± 1.42	15.84± 0.75	27.38± 2.31
C. V.		125.57±26.03	123.46±22.39	101.92± 8.44	90.34±12.36
Negro Females	*N*	19	39	48	—
Mean		16.82± 4.29	11.03± 1.30	15.31± 2.13	.....
Median		9.17± 5.38	8.50± 1.63	13.00± 2.67	.....
S. D.		27.72± 3.03	12.03± 0.92	21.87± 1.51	.....
C. V.		164.87±45.78	109.13±15.33	142.82±22.16	.....

From Table 52 there emerge two points of considerable interest. The first of these is the strikingly and uniformly *higher* percentages of active glandular tissue in the thymus glands of the Negroes than occur in the corresponding groups of whites. These differences cannot be accounted for on the score of age, as can be seen by referring to Table 2 *supra*. The reasonable conclusion would seem to be that we are probably dealing here with a real racial, constitutional difference.

Almost equally striking is the higher percentage of active glandular tissue in the *epileptoids* as compared with the other psychiatric groups. Here, to be sure, we have data only for males, but the differences are of the same relative order of magnitude in both races, white and Negro.

Applying the mean percentages of Table 52 to the mean absolute weights of Table 48 we have the following computed net mean weights of active tissue in the thymus glands in this material:

Negro epileptoid males = 4.18 gm.
Negro cycloid males = 2.98 gm.; females = 2.47 gm.
White epileptoid males = 2.46 gm.
Negro paranoid males = 1.88 gm.; females = 1.34 gm.
White schizoid males = 1.70 gm.; females = 1.02 gm.
Negro schizoid males = 1.60 gm.; females = 1.68 gm.
White cycloid males = 1.20 gm.; females = 0.95 gm.
White paranoid males = 1.16 gm.; females = 0.91 gm.

The compensatory relationship between absolute weight of thymus and percentage of active tissue, as between the whites and Negroes, is interesting. The Negroes in this material have on the average smaller thymus glands in absolute weight, but so much higher percentage of active tissue that there remains a net balance of active thymic tissue in their favor.

THE INTER-CORRELATIONS OF CERTAIN ENDOCRINE GLANDS

One of the most important results that has emerged from the intensive study of endocrinology in recent years has been the demonstration of the intimate physiological correlation that exists in the operation of the separate glands that constitute the endocrine system. For example, it has been shown by Smith [20] that removal of the hypophysis in the rat is followed by progressive atrophy of the genital system, the thyroids, parathyroids, and adrenal cortex. In a biometric study of the

[20] Smith, P. E. The disabilities caused by hypophysectomy and their repair. *Jour. Amer. Med. Assoc.*, Vol. 88, pp. 158-161, 1927.

TABLE 53

Coefficients of Correlation (r) for Four Endocrine Organs Correlated Inter se

GROUP	HYPOPHYSIS AND THYROID	HYPOPHYSIS AND ADRENAL	HYPOPHYSIS AND GONAD	THYROID AND ADRENAL	THYROID AND GONAD	ADRENAL AND GONAD	UNWEIGHTED AVERAGE FOR GROUP
White male cycloids	+.022± .094	+.083± .090	+.056± .091	−.122± .094	+.078± .094	+.004± .091	+.020
White female cycloids	+.136± .141	−.037± .138	+.353± .151	+.410± .141	+.267± .155	+.439± .144	+.261
Negro male cycloids	−.118± .121	+.112± .116	−.132± .116	+.584± .121	+.172± .121	+.084± .114	+.117
Negro female cycloids	+.057± .132	−.030± .119	+.357± .141	+.295± .130	−.111± .155	+.379± .138	+.158
Unweighted average for cycloids	+.024	+.032	+.159	+.292	+.102	+.227	+.139
White male paranoids	+.162± .052	+.224± .051	+.004± .051	+.186± .052	+.209± .052	+.126± .051	+.152
White female paranoids	+.246± .081	+.392± .076	+.156± .084	+.147± .081	−.063± .089	+.008± .082	+.148
Negro male paranoids	−.025± .103	+.343± .104	+.185± .102	+.387± .103	+.507± .103	+.377± .104	+.296
Negro female paranoids	−.118± .111	+.177± .103	+.090± .117	+.134± .112	−.070± .130	−.016± .116	+.033
Unweighted average for paranoids	+.066	+.284	+.109	+.214	+.146	+.124	+.157
White male schizoids	+.086± .049	+.203± .049	+.062± .048	+.050± .049	+.075± .049	+.206± .049	+.114
White female schizoids	−.274± .078	+.285± .074	+.243± .081	+.278± .078	+.061± .086	+.071± .081	+.111
Negro male schizoids	+.229± .059	+.315± .058	+.147± .058	+.187± .059	+.178± .059	+.074± .058	+.188
Negro female schizoids	+.048± .081	+.210± .075	+.127± .089	+.213± .080	+.246± .094	+.140± .088	+.164
Unweighted average for schizoids	+.022	+.253	+.145	+.182	+.140	+.123	+.144
Unweighted average for all groups	+.038	+.190	+.137	+.229	+.129	+.158	+.147

endocrine glands the question naturally raises itself as to whether there is a corresponding statistical correlation between the weights of the several glands. To answer this question with absolute completeness and comprehensiveness would involve an amount of computation that we have frankly felt unable to undertake—or rather have felt inadvisable after a preliminary survey of the matter. Consequently we have compromised by calculating all the possible zero-order correlation coefficients between four endocrine organs—hypophysis, thyroid, left adrenal, and right gonad—for all psychiatric, race, and sex subdivisions of our material except the epileptoids. These are omitted because of the small numbers available. Within the limits of sampling error the correlations are linear throughout. The coefficients are shown in Table 53. In order to get a rough idea of the general trends of the 72 correlation coefficients in this table unweighted averages have been computed with due regard to signs.

It is plain from the data of Table 53 that there is a general tendency towards positive correlation between the four endocrine organs involved. Sixty of the coefficients are positive in sign, and only 12 negative. But the degree of correlation is generally low. Twenty-three, or approximately one-third of the 72 coefficients, are numerically smaller than their probable errors, and can only be regarded as sensibly equal to zero. Seventeen more are numerically less than twice the probable error. Hence in total there are 40 out of the 72 coefficients probably not significantly different from zero, having regard to probable errors.

There is no evidence that the inter-correlations of the four endocrine organs dealt with are significantly higher in any one psychiatric group than in any other. Nor are there regular and orderly differences in the endocrine inter-correlations favoring either sex or race over the other.

Altogether the reasonable conclusion seems to be that the intimate physiological relationship between at least four organs here dealt with is not strikingly, or even clearly, reflected in the statistical correlations between their weights.

THE ENDOCRINE PATTERN OF THE INSANE

So far the discussion has been of each of the endocrine organs as separate entities, and, in the immediately preceding section, of the purely statistical inter-correlations of four of the more important of them. But in the physiological economy of the organism the endocrine

system functions as a coordinated and integrated *whole,* into which the several component elements (thyroid, gonads, etc.) are fitted in a standard, normal pattern. This raises a question about which it is desirable to know what the biometric evidence has to offer. This question may be put in this way: Insofar as may be indicated by organ weights, what is the quantitative pattern of the endocrine system in the insane? Does it differ from the endocrine pattern of the "normal" person—meaning by "normal" the person not mentally diseased? If so, how?

These questions are easier to ask than to answer precisely. A prime difficulty is that we lack data on endocrine organ weights from a homogeneous group of persons not mentally diseased, but of generally the same racial stocks, age, and anthropological characteristics as the insane persons with whom they are to be compared. Furthermore in such an ideal "normal" group *all* the endocrine organs from each individual should have been examined, weighed, etc. by a uniform technique, just as has been the case in collecting the data of the present paper from the insane. No body of "normal" data of this sort exists. What we have been compelled to do in this paper, in order to make any comparisons at all is to take, from what seems to us the best source existing at the present time, the most reliable figures for each *separate* endocrine organ. But in practically every case the "normal" data for a particular organ came from a different set of human beings. Furthermore they are all European data, in contrast to ours that are from Americans. However, this is the best, indeed all that can be done in the present stage of development of quantitative pathology. But it is obvious that under such circumstances it will be necessary to exercise the most cautious reserve in drawing general conclusions.

How shall we go about setting up a quantitative picture of the endocrine pattern as a whole? After trying various schemes we have decided that only a mathematically simple one would be warranted, considering the inherent difficulties and defects of the basic data already discussed. Consequently we have proceeded as follows:

1. What is the total absolute mass of the endocrine system as a whole (the sum of the weights of the seven separate organs [21] here

[21] The only important endocrine organ omitted from the discussions of this paper is the pancreas. We have analyzed the data for the pancreas with the same thoroughness and completeness that has been devoted to the others. But we have omitted this organ from the paper for the following reasons. First, the pancreas

dealt with) in "normals," and in each of our psychiatric groups? It would be extremely desirable, in addition to this, to know the total mass of the endocrine system relative to total mass of the body, but unfortunately data for this are not available for "normals." And furthermore, the results of this paper indicate that the quantitative *pattern* of the whole endocrine system is not essentially different if stated in relative or in absolute weights.

TABLE 54

Mean Total Weights of Endocrine System

GROUP	MEAN TOTAL WEIGHT OF WHOLE ENDOCRINE SYSTEM (*gm.*)
White "normals"—Males	92.432[23]
White "normals"—Females ...	61.644[24]
White cycloids—Males	92.598
White cycloids—Females	55.748
White paranoids—Males	86.756
White paranoids—Females	53.530
White schizoids—Males	82.327
White schizoids—Females	46.515
White epileptoids—Males	87.374
Negro cycloids—Males	80.358
Negro cycloids—Females	56.096
Negro paranoids—Males	83.916
Negro paranoids—Females	52.086
Negro schizoids—Males	70.011
Negro schizoids—Females	51.679
Negro epileptoids—Males	81.336

is an organ of both external and internal secretion. Second, the part of the whole organ that performs the function of external secretion is quantitatively much larger than the part that furnishes the internal secretion. Therefore it seems logically clear that the gross weight of the whole pancreas probably has little or no real significance in problems relating to endocrinology.

[23] Or 92.499 if Danisch's "normal" parathyroid weights are assumed to represent only half the total parathyroid tissue.

[24] Or 61.711 on the same assumption as in the preceding footnote.

2. If the total mass of the endocrine system is taken as 100, the proportionate part (percentage) contributed by each separate organ to the whole may be computed for each group of individuals. These figures will give an expression of the composition of the pattern of the whole system in a particular group. This expression will admittedly be a somewhat crude one, but it will at least be fairly comparable from group to group, insofar as the basic data justify such comparison at all. Our psychiatric groups are, we believe, justly comparable *inter se*. The doubt, for reasons already stated, concerns chiefly the so-called "normals."

Table 54 gives the total weights of the endocrine system as a whole for the several groups dealt with in this discussion.

It is evident from Table 54 that generally, with the white male cycloids the only exception, the insane persons composing the present material have on the average absolutely smaller endocrine systems than the "normal" with whom they are compared. But it is not clear whether this means anything more than that the persons in the insane population with which we are working are, on the average, somewhat undersized as compared with general populations, as was pointed out earlier in this paper. Data are lacking to settle the point absolutely and exactly, but inferentially we may be able to throw a little further light on it through other considerations. It is possible from the data of this paper to determine with reasonable probability whether the differences shown in mean total weight of the endocrine system between the four psychiatric types are due chiefly to differences in body weight. Table 55 is constructed to give some evidence on the point.

The bases of Table 55 are respectively the averages of mean body weight and mean total endocrine system weight for the 14 race-sex-psychosis groups of our material. With these two general averages taken as 100 the relative figures shown in Table 55 were computed from the observed means for each of the 14 groups. The results are to be interpreted in the manner illustrated by the following example: If the mean total weight of the endocrine system as a whole in white male cycloids was strictly proportional to the mean body weight of that group the value in the second column of Table 55 would be 111. But actually it is 132. This means that the white male cycloids had an *excess* of mean total endocrine system weight of 21 per cent above the 111 expected from strict proportionality to body weight. The other pairs of figures in the table are to be interpreted in the same way. The

significant figures are the differences in the third column. When these are (+) the groups concerned have, on the average, a surplusage of total endocrine weight in proportion to body weight; when they are (—) there is a deficiency of total endocrine weight, on the average, relative to body weight.

TABLE 55

Relative Mean Body Weights and Total Endocrine System Weights

GROUP	RELATIVE MEAN BODY WEIGHTS	RELATIVE MEAN TOTAL ENDOCRINE SYSTEM WEIGHTS	DIFFERENCE
White cycloids—Males	111	132	+21
White cycloids—Females	86	80	— 6
White paranoids—Males	111	124	+13
White paranoids—Females	84	76	— 8
White schizoids—Males	98	118	+20
White schizoids—Females	79	66	—13
White epileptoids—Males	122	125	+ 3
Negro cycloids—Males	112	115	+ 3
Negro cycloids—Females	105	80	—25
Negro paranoids—Males	115	120	+ 5
Negro paranoids—Females	94	74	—20
Negro schizoids—Males	91	100	+ 9
Negro schizoids—Females	84	74	—10
Negro epileptoids—Males	108	116	+ 8

In general, it appears from Table 55 that amongst the insane patients composing the present material the males in every case show an *excess* in mean total weight of the endocrine system as a whole, over what would be expected from strict proportionality to body weight (taking the averages of the whole material together as the bases of expected proportionality); while, on the other hand, the females show a *defect* of total endocrine weight in each case. The excesses for white males are relatively large, and those for Negro males relatively small. These relations are just reversed for the females. The deficiencies in mean total endocrine weight relative to body weight are generally small

TABLE 56

TABLE 56

Proportionate Contributions of Each Endocrine Organ to the Total Weight of the Endocrine System as a Whole

	"NORMAL"		CYCLOIDS		PARANOIDS		SCHIZOIDS		EPILEPTOIDS
	Males	Females	Males	Females	Males	Females	Males	Females	Males
				A. Whites					
Gonads	37.7	11.6	36.4	7.0	33.9	7.3	34.1	9.2	36.4
Thyroid	32.5	49.2	24.1	34.9	25.6	30.7	26.0	34.8	25.5
Adrenals	14.4	19.9	17.1	25.1	17.8	25.9	18.0	27.9	18.2
Thymus	14.3	17.7	21.2	31.1	21.5	33.9	20.7	25.7	18.6
Hypophysis	.739	1.257	.740	1.338	.792	1.502	.845	1.577	.835
Epiphysis	.175	.263	.182	.306	.208	.358	.203	.388	.208
Parathyroids	.072[34]	.109[35]	.162	.254	.182	.270	.176	.325	.174
				B. Negroes					
Gonads	.....	.....	33.8	7.3	34.6	8.6	33.4	10.4	33.5
Thyroid	.....	.....	28.8	40.1	29.4	42.5	30.7	41.0	29.4
Adrenals	.....	.....	18.1	24.3	16.8	23.3	19.7	25.2	18.9
Thymus	.....	.....	17.9	26.2	18.1	23.4	14.7	21.3	17.0
Hypophysis	.....	.....	.962	1.526	.829	1.564	1.029	1.589	.936
Epiphysis	.....	.....	.208	.304	.158	.307	.216	.300	.168
Parathyroids	.....	.....	.209	.338	.213	.367	.228	.295	.218

[34] Or .145 on the assumption that Danisch's "normal" average is one-half the total parathyroid weight.
[35] Or .217 on the same assumption as in the preceding footnote.

in the white females but large in the Negro females. The only exception to this is for the schizoid females, where in both races the relative deficiency is medium in amount.

We turn back now to our problem of *endocrine pattern*. To the total weight of the endocrine system as a whole, in each group, what *relative* contribution is made by each separate organ? The data to answer this question are given in Table 56.

The following example will make plain the manner in which Table 56 is to be read. In the "normal" white males 37.7 per cent of the total weight of the endocrine system as a whole is contributed by the gonads, as against 14.3 per cent contributed by the thymus; whereas in the present group of white male paranoids the gonads contribute 33.9 per cent and the thymus 21.5 per cent. And so similarly for other comparisons.

To make still clearer and more graphic the comparison of the total endocrine pattern of the insane, as indicated by the present material, with that of the "normal," Table 57 has been prepared from the data of Table 56. In Table 57 a + sign indicates that the proportionate contribution of a particular organ to the total weight of the endocrine system as a whole is *greater* in the particular group for which the + sign appears than it is in the "normals." A — sign indicates that the proportionate contribution is *less* in the particular group than it is in the "normals." An = sign indicates that the proportionate contribution is the same in the particular group and the "normals" (within one in the third decimal place). The figures in brackets following each + or — sign in Table 57 have the following significance:

(0) means that the *difference* between the proportionate contribution in the particular group and the "normal" is less than one-tenth of the proportionate contribution of the "normals."

(1) means that the *difference* is one-tenth or more (but less than two-tenths) of the proportionate contribution in the "normals."

(2) means that the *difference* is two-tenths or more (but less than three-tenths) of the proportionate contributions in the "normals."

And so on for higher figures.

The striking thing about Table 57 is the marked regularity and uniformity of its trends. For all race-sex-psychosis groups the signs are — in the first two lines of the table. This means that the proportionate contributions of gonads and thyroid to the total weight of the endocrine system as a whole are *uniformly less in the insane* (as judged by the

TABLE 57

The Pattern of the Endocrine System as a Whole in the Insane, as Compared With the "Normals." (For explanation see text)

	Cycloids		Paranoids		Schizoids		Epileptoids	
	White	Negro	White	Negro	White	Negro	White	Negro
MALES								
Gonads	−(0)	−(1)	−(1)	−(0)	−(0)	−(1)	−(0)	−(1)
Thyroid	−(2)	−(1)	−(2)	−(0)	−(2)	−(0)	−(2)	−(0)
Adrenals	+(1)	+(2)	+(2)	+(1)	+(2)	+(3)	+(2)	+(3)
Thymus	+(4)	+(2)	+(5)	+(2)	+(4)	+(3)	+(3)	+(1)
Hypophysis	=	+(1)	+(0)	+(1)	+(1)	+(3)	+(1)	+(2)
Epiphysis	+(0)	+(1)	+(1)	−(1)	+(1)	+(2)	+(1)	−(0)
Parathyroids[36]	+(12)	+(19)	+(15)	+(19)	+(14)	+(21)	+(14)	+(20)
FEMALES								
Gonads	−(4)	−(4)	−(4)	−(2)	−(2)	−(1)	.....	
Thyroid	−(2)	−(1)	−(3)	−(1)	−(2)	−(1)	.....	
Adrenals	+(1)	+(2)	+(3)	+(1)	+(4)	+(2)	.....	
Thymus	+(7)	+(4)	+(9)	+(3)	+(4)	+(2)	.....	
Hypophysis	+(0)	+(2)	+(1)	+(2)	+(2)	+(2)	.....	
Epiphysis	+(1)	+(1)	+(3)	+(1)	+(4)	+(1)	.....	
Parathyroids[37]	+(13)	+(21)	+(14)	+(23)	+(19)	+(17)	.....	

present material) than they are in the white "normals" with whom they are here compared. The amount of this relative deficiency is generally insignificantly small in the case of the male gonads, but much more considerable generally in the case of the female gonads (in part undoubtedly due to age relations). The deficiency of thyroid in the insane is generally somewhat larger in the males than the gonadal deficiency, and is of the order of 10 to 30 per cent in the females.

[36] On the assumption that Danisch's "normal" average is one-half of the total parathyroid weight the signs and figures in this row become: +(1), +(3), +(2), +(3), +(1), +(3), +(1), +(3)

[37] On the same assumption as in the preceding footnote the signs and figures in this row become: +(1), +(3), +(2), +(4), +(3), +(3).

For all the other endocrine organs (adrenals, thymus, hypophysis, epiphysis and parathyroids) the proportionate contribution to the total weight of the endocrine system as a whole is *greater in the insane* of the present material than in the white "normals" with whom they are compared, except in three out of the 70 race-sex-psychosis-organ groups (hypophysis in white male cycloids, epiphysis in Negro male paranoids and epileptoids). The excess contribution among the insane is greatest for thymus, parathyroids, and adrenals. The excess is least for epiphysis and hypophysis.

In general we are presented with a clear and consistent picture of the manner in which the present sample of insane persons differ in endocrine pattern from the most reliable "norm" at present available so far as concerns mean weight relations. The insane are definitely deficient relatively in thyroid tissue, but markedly over-supplied relatively with parathyroid and thymic tissue, and also definitely over-supplied relatively with adrenal tissue but not to so great an extent quantitatively as with the two former organs. In respect of pituitary and pineal tissue the insane show only a generally small and probably insignificant relative excess. The insane males exhibit a slight and probably insignificant relative deficiency of testicular tissue, and the insane females a more marked relative deficiency of ovarian tissue.

As between the four different psychiatric groups in this material compared *inter se* there appear no marked or significant differences in quantitative pattern of the endocrine system as a whole. If, as has been suggested by psychiatrists and clinicians, differences of endocrine pattern are etiologically concerned in producing different psychoses such a relationship is quite clearly and definitely *not* reflected in the weight relations of the organs in the present material. While we have no desire to press the point, nor indeed to do anything more than to state clearly our own definite results as a modest contribution to the slowly accumulating body of precise knowledge about various aspects of endocrinology, we cannot refrain from expressing the opinion that a good deal of the alleged theoretical basis and explanatory elucidations of clinical endocrinology, especially in the constitutional and personality fields, seems to the quantitatively minded biologist highly speculative, to put the matter with becoming mildness.

SUMMARY AND DISCUSSION

From considerations of space we do not propose to resummarize here the detailed results obtained from this long and extremely laborious study. Nor is there any real reason to do so because at the end of the several sections of the paper dealing with each of the endocrine glands a summary of the results regarding that gland has been given. Here we shall attempt only a succinct statement of what seem to us to be the more important results of general significance. These are:

1. The paper contributes a detailed biometric analysis of the individual weights of the seven organs constituting the endocrine system as usually understood (gonads, thyroid, adrenals, thymus, pituitary, pineal, and parathyroids) derived from the autopsies of 1337 mentally diseased persons dying in a hospital for the insane. The autopsies and weighings were all performed according to the same standard technique. The resulting body of material is by far the largest and most comprehensive ever collected up to this time regarding the weight relations of the endocrine organs.

2. The patients comprising the material turn out to be, in common with other American urban hospital series hitherto thoroughly analyzed (those of Draper, and Pearl and Ciocco), on the average somewhat under-sized in comparison with random samples of the general population, whether estimated by stature or by body weight.

3. Detailed actuarial comparisons with standard life table values show that the paranoids in this material not only lived longer on the average than the patients in any other psychiatric group, but actually longer than the expectation of life of comparable groups of the general population, the psychosis thus appearing paradoxically to act as a life preserver. The epileptoids, on the contrary, in general fell considerably short of their normal life table expectation of an average duration of life. The cycloids and schizoids in general occupied an intermediate position in life duration between the other two psychiatric groups mentioned, but with some exceptions amongst the Negroes.

4. While normally Negroes, as is well known, have an average duration of life much inferior to that of whites, the insane Negroes of this material show generally a definitely greater longevity relative to the life table expectation of comparable portions of the general population than did the corresponding groups of whites. In fact the *absolute* mean durations of life of the Negroes in this material were nearly the same as those of the whites, the differences not being statistically significant,

having regard to probable errors, except in the case of female schizoids and epileptoids. It is suggested that the explanation of this novel and unexpected result is to be found in the combined circumstances that duration of stay in an hospital for the insane is generally long, and that the favorable environment in respect of quiet, food, housing, etc. is comparatively and differentially more favorable to Negroes than to whites, considering the average environmental circumstances of both races outside the hospital. It is to be noted, however, that the suggested explanation is not capable of proof from the evidence at our disposal and is therefore hypothetical. Furthermore it is not by any means the only conceivable explanation of the observations. They might be at least partly accounted for if it were the fact that ages at onset of insanity were generally higher in the Negroes than in the whites, or if insanity acted as a more potent positive selective agent for longevity in Negroes than in whites, in the sense of being more likely to occur in inherently long-lived Negroes rather than in inherently short-lived. But in any case the facts regarding age brought out in this paper present an interesting biological problem worthy of more careful study by those dealing with the insane.

5. The evidence presented in this paper indicates that the quantitative pattern of the endocrine system as a whole, as indicated by organ weights, probably differs in a rather orderly and regular manner from that of the "normal" population (i.e., those not mentally diseased to the degree requiring segregation in a mental hospital). This probably concerns not so much the total mass dosage of all the endocrine organs taken together as a whole in proportion to body size, though possibly the insane may be to a small degree differentiated from the "normal" in this respect. But the differentiation in respect of the *pattern* of the endocrine system (the proportionate quantitative contribution of the several endocrine organs to the mass of the system as a whole) is certainly more striking and probably more important biologically. The marked differences between the endocrine pattern of the insane in the present material and that of the best available "norm" may be summarized as follows, but it must be understood that the data we have taken as "normal" for purposes of comparison are characterized, from a statistical point of view, by a number of evident disabilities.

a. In the insane the gonads and the thyroid uniformly in all psychiatric types make a slightly *smaller* relative contribution to the total

weight of the endocrine system as a whole than is the case in the "normals."

b. In the insane the thymus and the parathyroids uniformly in all psychiatric types make a *larger* relative contribution to the total weight of the endocrine system as a whole than is the case in the "normals."

c. In the insane the adrenals, hypophysis and epiphysis also each make a *larger* relative contribution to the total weight of the endocrine system as a whole, practically uniformly in all psychiatric types, than is the case in the "normals." In the case of the adrenals this excess is probably significant biologically; in the case of the hypophysis and epiphysis probably not.

These results obviously suggest a therapeutic experiment, perhaps in the realm of what Darwin was fond of calling "fool" experiments, but still one that interests the speculative faculties of the mind at least. Suppose it were practically possible by appropriate surgical procedures to reduce, in a group of insane patients, the total mass of parathyroid, thymic, and adrenal tissue in each individual in the group, and at the same time (which could be quite easily done) give them a bit more of the thyroid and appropriate gonadal hormones, would the subsequent behavior of these patients become more nearly normal? We make no prediction, nor are we to be understood as even advocating the trial. We only suggest that the results of such an experiment would be extremely interesting to the biologist.

6. The results of this study indicate rather unequivocally that there is no striking, orderly, constant or significant difference in quantitative endocrine pattern between the four psychiatric disease types here dealt with—cycloids, paranoids, schizoids, and epileptoids. We are disposed to the view that if any such endocrine pattern differentiation really exists in fact and in general between these psychiatric types, our material, imperfect as it is, is still adequate to have given some definite indication of its existence. And there is no such indication. Such occasional statistically significant differences as there are in this material between the psychiatric types in respect of details of endocrine pattern are irregular, disorderly and not general.

The large amount of work that has gone into this study, and the concentrated thought that has been required to bring some order out of the bewildering mass of detailed figures, has had the result of leaving in our minds at the end a broad question, or series of interrelated questions. Is it not barely possible that the present state of endocrinology

reflects in some measure the very ancient logical fallacy of unjustified inference from the particular to the general? It will not be questioned, probably, that (a) the great accepted generalizations or "laws" of endocrinology are chiefly quantitative in essence and intent—matters of "more" or "less" hormone producing certain definite results upon personality; and that (b) these generalizations are chiefly based upon application of the method of the crucial experiment upon lower animals, the results being subsequently extended analogically and inferentially to man. Such extension has been held to be "confirmed" by clinical observations. But most clinical pictures in man are excessively complex and are all too often somewhat blurred and vague, especially where "personality" is involved. Because rats can be made to grow larger by injecting appropriate pituitary hormones, and because some human beings with pathological hypophyses are extremely tall, is there justification for concluding that the stature of *all normal human beings* is primarily determined by the size and/or "moreness" or "lessness" of the functional adequacy of their hypophyses? Yet is it not something like this sort of reasoning that leads to a great many of the extremely positive and dogmatic statements to be found in the literature of endocrinology?

The biometrician is sometimes justly sceptical of the results of so-called "crucial" experiments in this as in other fields, when they plainly disregard or violate the most elementary canons of stochastic reasoning. With equal justice the experimenter *pur sang* is impressed with the sterile biological futility of elaborate statistical researches that lead only to the equivalent of that profound deduction made by Herbert Spencer to the effect that it was not essential to attend a horse race to know that some horses could run faster than others.

In raising these questions we have no desire or intention to criticise anybody, or to cast unwarranted slurs upon the fine and brilliant work that has been done in endocrinology. Our motivation is merely a keen desire to know and understand more precisely just exactly what the general biological significance and physiological limitations of the endocrine functions are, especially in relation to human personality and human biology generally. We believe that it cannot be successfully denied that the *corpus* of present day psychiatric literature conveys, and is intended to convey, the idea that the endocrine pattern is a significant and important causal factor in the etiology of those abnormalities of behavior that are collectively subsumed under the term "insanity." But where is there precise *proof*, in the truly scientific sense,

that this is so? As has already been suggested the results of the present paper seem to us to indicate with some orderly regularity and generality that the pattern of the endocrine system as a whole *may be* really and significantly different in the insane from what it is in those not mentally diseased. But to prove this will require more evidence, and evidence of a different character, than that we have been able to present here, or than has hitherto been presented by anybody else in our opinion. Is it not clear, however, that until such precise and definite probative evidence *is* brought forward, vague generalizations about the importance of the endocrine glands in insanity are premature?

STUDIES IN HUMAN INHERITANCE XII.
THE APPLICATION OF THE GENE-FREQUENCY METHOD OF ANALYSIS TO SEX-INFLUENCED FACTORS, WITH ESPECIAL REFERENCE TO BALDNESS

BY LAURENCE H. SNYDER AND HAL C. YINGLING

Ohio State University

PART I. FREQUENCY ANALYSIS

THE ANALYSIS of heredity in human beings by means of the frequencies of the genes concerned is rapidly becoming of primary importance. Such analyses have already been used in the study of the blood groups (Bernstein, 1925, 1930; Snyder, 1926, 1929; Wiener, Lederer and Polayes, 1929, 1930), the M-N agglutinogens (Wiener, 1931), the taste deficiencies (Snyder, 1932, 1934a) and others. The extension of the use of the gene-frequency analysis is greatly to be desired (cf. Snyder, 1934b). The opportunity presents itself to use this method in the study of sex-influenced factors, and we have attempted to do this with the character baldness.

While loss of hair may be in some instances due to disease (thyroid disease, seborrhea, syphilis, *et al.*), pattern baldness seems without doubt to be due to heredity. Osborn (1916) presented convincing evidence that pattern baldness is due to a single pair of factors, and that these are sex-influenced. The family histories presented by Osborn, as well as those given by other authors (cf. Sedgwick, 1863, *et al.*) bear out this interpretation. It now becomes possible to test this hypothesis on the gene-frequency basis. This is done as follows:

Let B = gene for baldness
and let b = gene for non-baldness
Then let p = frequency of B
and let q = frequency of b
so that $p + q = 1$

On the assumption that baldness is due to a sex-influenced factor, both men and women of the formula BB will develop baldness, while both men and women of the formula bb will not. Men of the formula Bb will develop baldness, while women of this formula will not. Hence sex must be taken into account in deriving the frequencies. Using X and Y to represent the sex chromosomes, random mating will result in the production of offspring with the following frequencies:

	$\frac{p}{2}$ BX	$\frac{p}{2}$ BY	$\frac{q}{2}$ bX	$\frac{q}{2}$ bY
	1	2	3	4
p BX	$\frac{p^2}{2}$ BBXX	$\frac{p^2}{2}$ BBXY	$\frac{pq}{2}$ BbXX	$\frac{pq}{2}$ BbXY
	5	6	7	8
q bX	$\frac{pq}{2}$ BbXX	$\frac{pq}{2}$ BbXY	$\frac{q^2}{2}$ bbXX	$\frac{q^2}{2}$ bbXY

On the basis of sex-influenced factors, it is seen that in the above frequency table two squares may be completely isolated. Square 1 will contain all the bald women. Square 8 will contain all the non-bald men. It is thus possible to derive p and q independently, a derivation which can not be made in the case of an ordinary dominant or recessive autosomal factor, where p can only be calculated as $1-q$. In the case of baldness,

$\frac{p^2}{2}$ = proportion of bald women in the general population,

and $\frac{q^2}{2}$ = proportion of non-bald men in the general population.

The proportion of bald women in the general population of men and women will be half of the proportion of baldness among women. Let us indicate the proportion of baldness among women as "bald ♀ ♀."

Likewise the proportion of non-bald men in the total population of men and women will be half of the proportion of non-baldness among men. Let us hereafter indicate the proportion of non-baldness among men as "non-bald ♂ ♂." These relations will hold whether the sex ratio is exactly one to one or not. It follows that

$$\frac{p^2}{2} = \frac{\text{bald } ♀\ ♀}{2}$$

$$p = \sqrt{\text{bald } ♀\ ♀} \qquad (1)$$

$$\frac{q^2}{2} = \frac{\text{non-bald } ♂\ ♂}{2}$$

$$q = \sqrt{\text{non-bald } ♂\ ♂} \qquad (2)$$

$$\text{so that } \sqrt{\text{bald } ♀\ ♀} + \sqrt{\text{non-bald } ♂\ ♂} = 1. \qquad (3)$$

It is thus possible to test the validity of the sex-influenced basis for the inheritance of baldness by determining the frequencies of baldness and non-baldness separately for men and women, and then testing whether or not equation (3) holds.

Baldness is an old established character in the human race, and we may reasonably assume that the population we have studied is in equilibrium in regard to it. If we obtain the proportions of baldness and non-baldness from a large enough group of individuals, and if these individuals are a representative sample of the population, the only appreciable source of error in our determination other than that of sampling will be mistakes in the diagnosis of baldness. To minimize the errors in diagnosis, the following precautions were taken.

First, only individuals of 35 years of age or older were used. Second, a group of individuals was selected in which baldness in women could be accurately determined. For this purpose the inmates of the State Hospitals for the Insane at Columbus, Ohio, and Moline, Ill., were chosen. Here the women do not hide baldness by means of transformations or other devices, and the condition can be readily recognized. Third, the loss of hair due to disease was eliminated from the calculations as far as possible, with the aid of the attendant physicians. Fourth, each individual was personally examined with considerable care, and the diagnosis made on the basis of pattern baldness (bald crown, receding forehead hair, etc.). It is our conviction, based on the

study of family histories, that all pattern baldness is due to the same pair of factors, the various patterns being due to modifying factors or other causes.

The proportions of baldness and non-baldness were determined for 3,966 inmates of the State Hospitals, over 35 years of age, of whom 2,083 were men and 1,883 were women. The results were as follows:

	BALD	NON-BALD
Males	.4296±.007	.5704±.007
Females	.0775±.004	.9225±.004

In order to use these proportions in a gene-frequency analysis, it must be shown that baldness is not correlated with insanity. To test this, the proportion of baldness among the male inmates was compared with the proportion of baldness among males in the general population, with the following results:

MALES	NO.	BALD	NON-BALD
Insane	2,083	.4296±.007	.5704±.007
Normal	200	.4050±.023	.5950±.023
Dev.	....	.0246±.026	.0246±.026

It is thus seen that the proportion of baldness in the male insane does not differ significantly from a random sample drawn from without the institutions.

Using these proportions, then, we find that

$$p = .278$$
$$q = .755$$

and testing equation (3) we find that

$$\sqrt{\text{bald } ♀\,♀} + \sqrt{\text{non-bald } ♂\,♂} = 1.033 \pm .009$$

The probable error of the deviation was obtained by the formula

$$\text{P. E.}_{\text{dev.}} = .3373\sqrt{\frac{1-B}{N_1} - \frac{(1-B)^2}{16B(N_1)^2} + \frac{1-D}{N_2} - \frac{(1-D)^2}{16D(N_2)^2}}$$

PEDIGREES ILLUSTRATING INHERITANCE OF BALDNESS

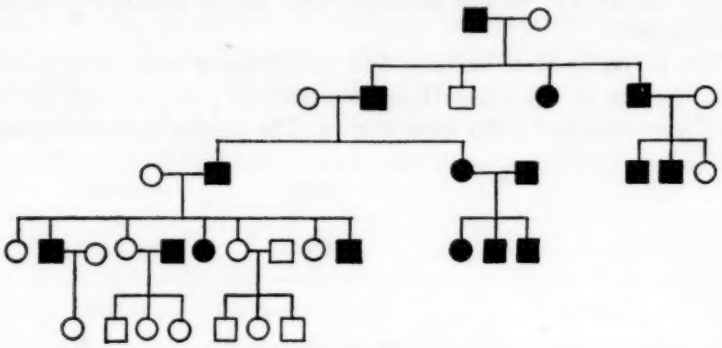


FIGURE 1.

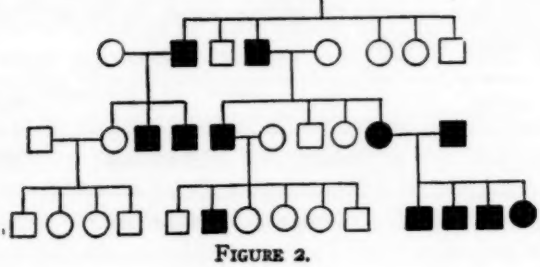


FIGURE 2.

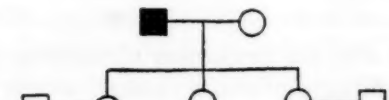


FIGURE 3.

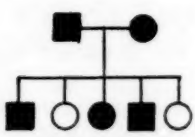


FIGURE 4.

where B = proportion of bald ♀ ♀, D = proportion of non-bald ♂ ♂, N_1 = number of individuals from which the value of B was derived, and N_2 = number of individuals from which the value of D was derived. The derivation of this formula is given in part III of this paper.

PART II. FAMILY HISTORIES

The presumptive evidence for a pair of sex-influenced factors affecting baldness, upon which the gene-frequency analysis is based, consists of the data obtained from pedigrees. To emphasize and to corroborate the fact that the pedigrees do indicate this type of inheritance, the following selected family histories are taken from our records.

Figures 1 and 2 illustrate the facts that baldness is more common in men than in women, that it is generally transmitted directly from a father to half or more of his sons but only to an occasional daughter, that a woman never shows it unless her father showed it, and that the sons of a bald woman will all be bald.

Figure 3 illustrates the fact that a man may be bald without either of his parents being bald: that is, he may apparently receive the factor from his mother in whom it was carried as a recessive. Figure 4 illustrates the fact that where both parents are bald, the sons must all show the character, but some of the daughters may not develop it.

All these facts are criteria of sex-influenced factors, and rule out all other simple types of heredity. Our records show many family histories illustrating these points. It can not be doubted, then, that the assumption is justified on the basis of pedigree data that baldness is dependent upon a pair of sex-influenced factors. When added to this the gene-frequency analysis supports the hypothesis reasonably well, we are completely justified in assigning this type of hereditary behavior to the factors concerned.

PART III. THE DERIVATION OF A FORMULA FOR THE PROBABLE ERROR OF THE DEVIATION OF $p + q$ FROM UNITY WHEN p AND q ARE COMPUTED FROM INDEPENDENT SAMPLES

Let A = non-bald ♀ ♀

and B = bald ♀ ♀

so that $A + B = 1$

and let C = bald ♂ ♂

and $D =$ non-bald ♂ ♂

so that $C + D = 1$

Then let $p^2 = B$, as derived in part I of this paper

so that $p = \sqrt{B}$

and likewise $q^2 = D$

so that $q = \sqrt{D}$

Now $B = b + e$, in which b is the true value of the proportion of baldness among women.

Then observed $p = \sqrt{b + e}$

and true $p = \sqrt{b}$

E, the error in observed p = observed p — true p

$$E = \sqrt{b + e} - \sqrt{b} \tag{4}$$

$$\sqrt{b} + E = \sqrt{b + e}$$

Squaring, $b + 2\sqrt{b}\,E + E^2 = b + e$

$$2\sqrt{b}\,E + E^2 = e \tag{5}$$

Squaring, $4bE^2 + 4\sqrt{b}\,E^3 + E^4 = e^2$ (6)

Disregarding values of E^3 and E^4, which approach 0, $4bE^2 = e^2$ (7)

Summing, $4b\Sigma E^2 = \Sigma e^2$

$$\Sigma E^2 = \frac{\Sigma e^2}{4b} \tag{8}$$

but $\Sigma\, e^2 = ab = b\ (1 - b)$

$$\text{hence } \Sigma\, E^2 = \frac{b\ (1 - b)}{4b} = \frac{1 - b}{4} \tag{9}$$

Summing (5), $2\sqrt{b}\,\Sigma E + \Sigma E^2 = \Sigma e$

but $\Sigma e = 0$, hence

$$2\sqrt{b}\,\Sigma\, E = -\Sigma\, E^2$$

$$\Sigma\, E = \frac{-\Sigma\, E^2}{2\sqrt{b}}$$

$$\Sigma\, E = -\frac{1 - b}{8\sqrt{b}} \tag{10}$$

$$\text{now } \sigma_E = \sqrt{\frac{\Sigma\, E^2}{N} - \left(\frac{\Sigma\, E}{N}\right)^2}$$

$$\text{hence } \sigma_B = \sqrt{\frac{1-b}{4N_1} - \frac{(1-b)^2}{64b\,(N_1)^2}} \tag{11}$$

letting N_1 = number of individuals from which the value of B was derived.

In similar fashion it can be shown that

$$\sigma_F = \sqrt{\frac{1-d}{4N_2} - \frac{(1-d)^2}{64d\,(N_2)^2}} \tag{12}$$

letting F = error in observed q, and N_2 = number of individuals from which the value of D was derived.

Since p and q were derived from independent samples, there is no correlation between the observed values,

$$\text{hence } \sigma_{p+q} = \sqrt{(\sigma_B)^2 + (\sigma_F)^2}$$

Since in practise b, the true value of the proportion of bald ♀ ♀ must be taken as B, the observed value, and likewise d must be taken as D, the probable error of the deviation from unity is as follows:

$$\text{P. E.}_{\text{dev.}} = .6745\sqrt{\frac{1-B}{4N_1} - \frac{(1-B)^2}{64B\,(N_1)^2} + \frac{1-D}{4N_2} - \frac{(1-D)^2}{64D\,(N_2)^2}} \tag{13}$$

$$= .3373\sqrt{\frac{1-B}{N_1} - \frac{(1-B)^2}{16B\,(N_1)^2} + \frac{1-D}{N_2} - \frac{(1-D)^2}{16D\,(N_2)^2}} \tag{14}$$

BIBLIOGRAPHY

BERNSTEIN, F. 1925, *Zeitschr. f. ind. Abst.—u. Vererbungsl.*, 37: 237; 1930, *ibid.*, 54: 400.

OSBORN, D. 1916, *Jour. Hered.*, 7: 347.

SEDGWICK, W. 1863, *Brit. and Foreign Med.-Chirurg. Rev.*, 31: 445; *ibid.*, 32: 159.

SNYDER, L. H. 1926, *Amer. Jour. Phys. Anthropol.*, 9: 233; 1929, Blood Grouping in Relation to Clinical and Legal Medicine, *Baltimore*, the Williams and Wilkins Co.; 1932, *Ohio Jour. Sci.*, 32: 436; 1934a, *Genetics*, 19: 1; 1934b, *Eugenical News*, 19: 61.

WIENER, A. S. 1931, *Jour. Immunol.*, 21: 157.

WIENER, A. S., LEDERER, M., and POLAYES, S. H. 1929, *Jour. Immunol.*, 16: 469; 1930, *ibid.*, 18: 201.

RECENT LITERATURE

USEFUL IN THE STUDY OF HUMAN BIOLOGY

In this department will be noticed the books and reprints which are currently received at the Editorial Office. Publications intended for notice here should be addressed to Dr. Raymond Pearl, Department of Biology, School of Hygiene and Public Health, 1901 East Madison Street, Baltimore, Maryland, U. S. A.

I. EVOLUTION AND GENETICS

1. *Evolution—General Principles*

BERGSON, HENRI. La Pensée et le Mouvant. Essais et Conférences. Cinquième Édition. *Paris* (Félix Alcan), 1934. Pp. 324. 8⅞ × 5½ inches. 25 francs.

DRIESCH, HANS. Die Maschine und der Organismus. *Leipzig* (Johann Ambrosius Barth), 1935. Pp. 76. 9⅛ × 6⅛ inches. 4.50 marks (paper). [Bibliographic footnotes].

JUCCI, CARLO. Eredità ed evoluzione. *Genus*, Vol. 1, pp. 7-28, 1934.

LAFFERTY, T. T. The material world. *Journal of Philosophy*, Vol. 31, pp. 505-513, 1934.

LAKHOVSKY, GEORGES. L'Oscillation Cellulaire. Ensemble des Recherches Expérimentales. *Paris* (Gaston Doin et Cie), 1931. Pp. 319. 9½ × 6¼ inches. 40 francs (paper). [Bibliography of 57 titles].

LAKHOVSKY, GEORGES. Le Secret de la Vie. Les Ondes cosmiques et la Radiation vitale. Deuxième édition revue et augmentée de "L'Origine de la Vie." Preface by Prof. d'Arsonval. *Paris* (Gauthier-Villars et Cie), no date. Pp. xxi + 261 + 6 plates. 7¾ × 5⅝ inches.

PARK, THOMAS. Experimental evolution. Being a review of *The Struggle for Existence* by G. F. Gause. *Quarterly Review of Biology*, Vol. 10, pp. 209-212, 1935.

2. *Human Evolution*

HURST, C. C. Heredity and the Ascent of Man. *New York* (The Macmillan Co.), 1935. Pp. ix + 138. 7¼ × 4⅞ inches. $1.50.

MARETT, R. R. Head, Heart and Hands in Human Evolution. *London* (Hutchinson's Scientific Books), 1935. Pp. 303. 8½ × 5½ inches. 10s. 6d. net.

3. *Prehistory and Archeology*

COLLUM, V. C. C. The Tressé Iron-Age Megalithic Monument. Its Sculptured Breasts and Their Relation to the Mother-Goddess Cosmic Cult. *New York* (Oxford University Press), 1935. Pp. xiv + 170 + 35 plates. 10 × 7½ inches. $4.00. [Bibliography of 7½ pages.]

COLTON, HAROLD S. Stages in Northern Arizona prehistory. *Museum Notes (Museum of Northern Arizona)*, Vol. 8, pp. 1-7, 1935. [Bibliography of 10 titles].

4. *Genetics—General Principles*

DAVENPORT, C. B. Annual Report of the Director of the Department of Genetics, Carnegie Institution of Washington. *Carnegie Institution Year Book* No. 33, pp. 31-60, for the year 1933-34. [Bibliography of 62 titles].

HALDANE, J. B. S. Genetics since 1910. *Nature*, Vol. 135, pp. 726-729, 1935.

HARRISON, ROSS G. Some difficulties of the determination problem. *American Naturalist*, Vol. 67, pp. 306-321, 1933. [Bibliography of 53 titles].

JENNINGS, H. S. Genetics. *New York* (W. W. Norton and Co.), 1935. Pp. xii + 373. 8½ × 5¾ inches. $4.00. ["Notes and References" at the end of each chapter].

JUCCI, CARLO. Il problema della distinzione dei sessi nei bachi da seta. Proposta di applicazione dell'eredità legata al sesso. *Rendiconti della R. Accademia Nazionale dei Lincei, Classe di Scienze fisiche, matematiche e naturali*, Vol. 18, pp. 508-512, 1933.

KOLTZOFF, N. K. Physiologie du Développement et Génétique. *Actualités Scientifiques et Industrielles, 254. Exposés de Biologie. (La Génétique et les Problèmes de l'Évolution). 1. Paris* (Hermann et Cie), 1935. Pp. 56. 10 × 6½ inches. 12 francs (paper). [Bibliographic footnotes].

5. *Human Heredity*

DAVENPORT, CHARLES B. Heredity and disease. *Scientific Monthly*, Vol. 34, pp. 167-169, 1932.

HALDANE, J. B. S. Anthropology and human biology. *Compte-Rendu du Congrès International des Sciences Anthropologiques et Ethnologiques, Première Session, Londres*, 1934, pp. 53-64.

HUTT, F. B. An earlier record of the toothless men of Sind. *Journal of Heredity*, Vol. 26, pp. 65-66, 1935. [Bibliography of 4 titles].

HUTT, F. B. Sex differences in the expression of autosomal genes affecting human dentition. *A Decade of Progress in Eugenics, Scientific Papers of the Third International Congress of Eugenics*, 1932, pp. 447-452. [Bibliography of 6 titles].

JANKOWSKY, WALTHER. Die Blutsverwandtschaft im Volk und in der Familie. Ein Beitrag zur menschlichen Lebenskunde (Anthropologie). *Stuttgart* (G. Schweizerbarth'sche Verlagsbuchhandlung (Erwin Nägele), 1934. Pp. viii + 166 + 6 plates. 9⅜ × 6 inches. 7.20 marks (paper). [Bibliography of 4 pages].

LENZ, F. Inwieweit kann man aus Zwillingsbefunden auf Erbbedingtheit oder Umwelteinfluss schliessen? *Deutsche Medizinische Wochenschrift*, Nr. 22, pp. (of reprint) 7, 1935. [Bibliography of 5 titles].

LEVIT, S. G. Dominance in man. *Comptes Rendus de l'Académie des Sciences de l'URSS*, Vol. 2, pp. 499-504, 1935. [1 bibliographic footnote]. [In Russian and English].

LEVIT, S. G. Sex-linked genes in man. *Comptes Rendus de l'Académie des Sciences de l'URSS*, Vol. 2, pp. 428-434. [In Russian and English].

LEVIT, S. G. Twin investigations in the U. S. S. R. *Character and Personality*, Vol. 3, pp. 188-193 + 1 plate, 1935. [2 bibliographic footnotes].

LEVIT, S. G., and G. V. SOBOLEVA. Comparative intrapair correlations of fraternal twins and siblings. *Journal of Genetics*, Vol. 30, pp. 389-396, 1935. [Bibliography of 6 titles].

NEWMAN, H. H. Mental and physical traits of identical twins reared apart. Case IX. Twins Harold and Holden. *Journal of Heredity*, Vol. 25, pp. 137-143, 1934.

SJÖGREN, TORSTEN. Vererbungsmedizinische Untersuchungen über Huntingtons Chorea in einer schwedischen Bauernpopulation. *Zeitschrift für Menschliche Vererbungs- und Konstitutionslehre*, Bd. 19, pp. 131-165 + 2 folding charts, 1935. [Bibliography of 32 titles].

6. *Eugenics*

DAVENPORT, CHARLES B. Presidential address: The development of eugenics. *A Decade of Progress in Eugenics, Scientific Papers of the Third International Congress of Eugenics*, 1932, pp. 17-22. [Portrait].

GINI, CORRADO. Gli effetti eugenici o disgenici della guerra. *Genus*, Vol. 1, pp. 29-42, 1934.

INTERNATIONAL FEDERATION OF EUGENIC ORGANIZATIONS. Report of the 11th Assembly. Conferences July from 18th to 21st (inclusive) 1934. Waldhaus Dolder, Zurich, Switzerland. *Archiv der Julius Klaus-Stiftung für Vererbungsforschung, Sozialanthropologie und Rassenhygiene*, Bd. 10, pp. 1-84, 1935. Zürich (Orell Füssli). 10 Swiss francs; copies to members and correspondents of the I. F. E. O. at the office, 443 Fulham Road, London, 3s. 6d. prepaid (paper). 9¾ × 5⅜ inches.

II. GROUP BIOLOGY

1. *Environment of Man*

DALY, REGINALD A. The Changing World of the Ice Age. *New Haven* (Yale University Press), 1934. Pp. xix + 271. 9¼ × 6¼ inches. $5.00. [Bibliographic footnotes].

GRINNELL, JOSEPH. A Revised Life-Zone Map of California. *University of California Publications in Zoölogy*, Vol. 40, No. 7. *Berkeley* (University of California Press), 1935. Pp. 3 + 1 map. 10¼ × 6½ inches. 25 cents (paper).

HICKLING, C. F. The Hake and the Hake Fishery, being The Buckland Lectures for 1934. *London* (Edward Arnold and Co.), 1935. Pp. 142. 7 × 4¾ inches. 3s. 6d. net.

JEWETT, FRANK B. Electrical communication: past, present, future. *Bell Telephone Quarterly*, Vol. 14, pp. 167-199, 1935.

MAXON, WILLIAM R. Natural history of Plummers Island, Maryland. *Proceedings of the Biological Society of Washington*, Vol. 48, pp. 115-138, 1935. [Bibliography of 3 titles].

NORBERG, INGA: Compiled by. Good Food from Sweden. Selections from Swedish Dishes Suited to an English Table. *London* (Chatto and Windus), 1935. Pp. vii + 176. 7¼ × 5 inches. 5 shillings net.

SCHOENICHEN, WALTHER. Urdeutschland. Deutschlands Naturschutzgebiete in Wort und Bild. Lieferungen 9, 10, 11. *Neudamm* (J. Neumann), 1935. Lief. 9, pp. 193-219 + 9 plates; Lief. 10, pp. 220-240 + 8 plates; Lief. 11, pp. 241-272 + 8 plates. 10¾ × 8¼ inches. 2 marks each (paper).

2. *Public Health and Hygiene*

[ANONYMOUS]. Health and Efficiency Holiday Annual. *Link House, London, E. C. 1* (Link House Publications), 1935. Pp. 63. 11 × 8½ inches. 1 shilling (paper).

KAUP, IGO. Gestaltlehre des Lebens und der Rasse. Lösung der Krise in der Medizin und Hygiene. *Leipzig* (Johann Ambrosius Barth), 1935. Pp. vi + 154. 9⅝ × 6¾ inches. 7.50 marks (paper). [Bibliographic footnotes].

KÜLBS, F. Gesundes Leben. *Leipzig* (Georg Thieme), 1935. Pp. 203. 8¾ × 5¾ inches. 4.80 marks.

LEAGUE OF NATIONS. Quarterly Bulletin of the Health Organisation, Vol. IV, Nos. 1 and 2. *Geneva* (Health Organisation, League of Nations); *New York* (World Peace Foundation), 1935. Pp. 192. 9½ × 6⅛ inches. Annual subscription $2.50; separate issue 65 cents (paper).

MILBANK MEMORIAL FUND. Policies and Procedures in Public Health. Proceedings of the Annual Conference of the Advisory Council of the Milbank Memorial Fund Held on March 27 and 28, 1935, at the New York Academy of Medicine. *New York*, 1935. Pp. 115. 9 × 6 inches.

NEYMAN, JERZY. O pewnych szczegółach statystyki ubezpieczonych na wypadek choroby w anglji w związku z systemem gospodarowania. *Przeglądu Ubezpieczeń Społecznych*, No. 1, 1935. Pp. (of reprint) 4.

NOVAK, EMIL. The Woman Asks the Doctor. *Baltimore* (The Williams and Wilkins Co.), 1935. Pp. x + 189. 8 × 5¼ inches. $1.50.

RANDALL, MARIAN G. Public health nursing service for urban preschool children. *Milbank Memorial Fund Quarterly*, Vol. 13, pp. 252-272, 1935. [Bibliography of 1 title].

UNION DES CAISSES D'ASSURANCES SOCIALES DE LA RÉGION PARISIENNE. Les Caisses d'Assurances Sociales et la Lutte Contre la Tuberculose. *Bulletin de Documentation*, Juin 1935, Numéro Spécial. *Paris*. Pp. 40. 10⅝ × 8½ inches. 3 francs (paper).

WILLIAMS, HUNTINGTON. The city health officer looks at diphtheria prevention. *American Journal of Public Health*, Vol. 25, pp. 425-429, 1935.

WILLIAMS, HUNTINGTON. The health department nurse and private medical practice. *Public Health Nursing*, June 1935, pp. (of reprint) 4. [Bibliography of 1 title].

3. *Migration*

BERTIN, LÉON. Migrations et Métamorphoses de l'Anguille d'Europe. *Actualités Scientifiques et Industrielles, 264. Exposés de Biologie Zoologique*, II. *Paris* (Hermann et Cie), 1935. Pp. 57. 10 × 6½ inches. 15 francs (paper). [Bibliography of 52 titles].

GOODRICH, CARTER, BUSHROD W. ALLIN, and MARION HAYES. Migration and Planes of Living, 1920-1934. *Philadelphia* (University of Pennsylvania Press), 1935. Pp. viii + 111 + 2 folding maps. 10 × 6¾ inches. $1.00 (paper). [Bibliographic footnotes].

4. *Population*

ALLEE, W. C. Concerning the organization of marine coastal communities. *Ecological Monographs*, Vol. 4, pp. 541-553, 1934. [Bibliography of 51 titles].

BODENHEIMER, F. S. Ueber die biologischen Grundlagen der menschlichen Bevölkerungslehre. *Genus*, Vol. 1, pp. 43-90, 1934. [Bibliography of 51 titles].

BONFANTE, PIETRO. La persistenza dei caratteri fisici e psichici nella popolazione dello stesso territorio. *Genus*, Vol. 1, pp. 3-6, 1934.

GINI, CORRADO. Premiers résultats d'une expédition italo-mexicaine parmi les populations indigènes et métisses du Mexique. *Genus*, Vol. 1, pp. 147-177, 1934.

GINI, CORRADO. Relazione della missione demografica del Comitato Italiano per lo studio dei problemi della popolazione in Tripolitania. *Genus*, Vol. 1, pp. 109-116, 1934.

GINI, CORRADO. I Samaritani. *Genus*, Vol. 1, pp. 117-146, 1934.

MASURE, R. H., and W. C. ALLEE. Flock organization of the shell parrakeet *Melopsittacus undulatus* Shaw. *Ecology*, Vol. 15, pp. 388-398, 1934. [Bibliography of 14 titles].

MASURE, R. H., and W. C. ALLEE. The social order in flocks of the common chicken and the pigeon. *The Auk*, Vol. 51, pp. 306-327, 1934. [Bibliography of 13 titles].

MCGREGOR, J. C. Arizona antelope. *Museum Notes* (*Museum of Northern Arizona*), Vol. 8, pp. 13-16, 1935. [Bibliography of 5 titles].

NETHERLANDS INDIES. Census of 1930 in the Netherlands Indies. Volume VII. Chinese and Other Non-Indigenous Orientals in the Netherlands Indies. *Batavia* (Departement van Economische Zaken), 1935. Pp. xiv + 429 + folding map. 10¾ × 9¾ inches. F. 8 (paper). [In Dutch and English].

PEARSON, S. VERE. The Growth and Distribution of Population. *London* (George Allen and Unwin), 1935. Pp. 448 + 1 plate. 9¼ × 6 inches. 12s. 6d. net. [Bibliographic footnotes].

POPULATION ASSOCIATION OF AMERICA. Population Redistribution. Round Table, Friday Afternoon, May 3, 1935, Conference on Population Studies in Relation to Social Planning, Hotel Willard, *Washington, D. C.* Pp. 25.

UNITED STATES DEPARTMENT OF COMMERCE. Types of families in the United States. Released for use of the morning papers on August 5, 1935. Pp. 4.

VOLTERRA, VITO, and UMBERTO D'ANCONA. Les Associations Biologiques au Point de Vue Mathématique. *Actualités Scientifiques et Industrielles*, 243. *Exposés de Biométrie et de Statistique Biologique*, V. *Paris* (Hermann et Cie), 1935. Pp. 96. 10 × 6½ inches. 20 francs (paper). [Bibliography of 6 pages].

5. *Mortality and General Vital Statistics*

BOLDUAN, CHARLES, and LOUIS WEINER. Infant mortality in New York City one hundred years ago. *Journal of Pediatrics*, Vol. 7, pp. (of reprint) 5, 1935.

CONNECTICUT DEPARTMENT OF HEALTH. Eighty-Sixth Registration Report of Births, Marriages, Divorces and Deaths for the Year Ended December 31, 1933. *Hartford* (State Department of Health), 1935. Pp. 308. 9 × 5⅝ inches.

MALZBERG, BENJAMIN. A statistical study of age in relation to mental disease. *Mental Hygiene*, Vol. 19, pp. 449-476, 1935.

SEIFERT, HARRY E. Life tables for Chinese farmers. *Milbank Memorial Fund Quarterly*, Vol. 13, pp. 223-236, 1935. [Bibliography of 11 titles].

SOUTH AFRICA. Report on the Vital Statistics of the Union of South Africa 1933. *Pretoria* (The Government Printer), 1935. Pp. liii + 83. 12¼ × 10 inches. 4s. 6d. (paper). [In English and Dutch].

6. *Morbidity and Epidemiology*

BOLDUAN, CHARLES F. The conquest of pestilence. *Milbank Memorial Fund Quarterly*, Vol. 13, pp. 219-222, 1935.

GREENWOOD, MAJOR. Epidemics and Crowd-Diseases. An Introduction to the Study of Epidemiology. *New York* (The Macmillan Co.), 1935. Pp. 409. 8½ × 5½ inches. $5.50. [Bibliography at the end of each chapter].

IWASZKIEWICZÓWNA, K., and J. NEYMAN. Sprawozdanie tymczasowe z Badań Instytutu spraw społeczynch nad chorobowością techniczną robotników w niektórych przemysłach. *Przeglądu Ubezpieczeń Społecznych*, No. 11, 1934. Pp. (of reprint) 7.

LEAGUE OF NATIONS, HEALTH ORGANISATION. Annual Epidemiological Report. Corrected Statistics of Notifiable Diseases for the Year 1933. *Geneva* (League of Nations), 1935. Pp. 108. 12½ × 9⅝ inches. [In French and English].

REINHARD, FERDINAND O. The venereal disease problem in the colored population of Baltimore City. *American Journal of Syphilis and Neurology*, Vol. 19, No. 2, pp. (of reprint) 12, 1935. [Bibliography of 1 title].

7. *Natality, Fecundity, Fertility*

KISER, CLYDE V. Fertility in Harlem Negroes. *Milbank Memorial Fund Quarterly*, Vol. 13, pp. 273-285, 1935. [Bibliographic footnotes].

LASORSA, GIOVANNI. Fertilità e fecondità della donna secondo l'età. *Journal de la Société Hongroise de Statistique*, Nos. 1-2, 1935. Pp. (of reprint) 41. [Bibliographic footnotes].

LASORSA, GIOVANNI. La Fecondità Legittima della Donna Secondo l'Età. *Padova* (Antonio Milani), 1934. Pp. vi + 81. 9¾ × 7 inches. L. 15. [Bibliographic footnotes].

WHELPTON, P. K. Causes of the decline in birth rates. *Milbank Memorial Fund Quarterly*, Vol. 13, pp. 237-251, 1935. [Bibliographic footnotes].

8. *Birth Control*

AMERICAN BIRTH CONTROL LEAGUE. Birth Control: an outline for group study. *New York* (American Birth Control League, 515 Madison Ave.), no date. Pp. 6.

HIMES, NORMAN E. The vital revolution. *Survey Graphic*, April 1935, pp. (of reprint) 4.

WHITE, FRANK W. Birth Control and Its Opponents. With a Foreword by Lord Horder. *London* (John Bale, Sons and Danielsson), 1935. Pp. xi + 164. 7⅛ × 4¾ inches. 3s. 6d. net. [Bibliographic footnotes].

9. *Marriage and Divorce*

[Vacant]

III. BEHAVIOR

1. *Racial and Genetic Psychology*

FOLEY, JOHN P., JR. Judgment of facial expression of emotion in the chimpanzee. *Journal of Social Psychology*, Vol. 6, pp. 31-67, 1935. [Bibliography of 157 titles]. [Abstracts in French and in German].

LÉVY-BRUHL, LUCIEN. Primitives and the Supernatural. Authorized Translation by Lilian A. Clare. *New York* (E. P. Dutton and Co.), 1935. Pp. 405. 8½ × 5¾ inches. $5.00. [Bibliographic footnotes].

LOVEJOY, ARTHUR O., and GEORGE BOAS. Primitivism and Related Ideas in Antiquity. Volume I of A Documentary History of Primitivism and Related Ideas. With Supplementary Essays by W. F. Albright and P.-E. Dumont. *Baltimore* (Johns Hopkins Press), 1935. Pp. xv + 482. 9⅝ × 6¼ inches. $5.00. [Bibliographic footnotes.]

2. *Individual Psychology*

FOLEY, JOHN P., JR. A critical note on certain experimental work on the conditioned response. *Journal of General Psychology*, Vol. 12, pp. 443-445, 1935. [Bibliography of 12 titles].

HERWERDEN, MARIANNE VAN; Drawings left by. Metamorphoses. With an introduction by Marie P. Löhnis. *Haarlem* (Joh. Enschedé en Zonen), 1934. Pp. 76. 8¼ × 5¼ inches. 2.25 guilders.

LEWIN, KURT. A Dynamic Theory of Personality. Selected Papers. Translated by Donald K. Adams and Karl E. Zener. *New York* (McGraw-Hill Book Co.), 1935. Pp. ix + 286. 9 × 5¾ inches. $3.00. [Bibliographic footnotes].

MANTEGAZZA, PAOLO. The Sexual Relations of Mankind. Translated from the Latest Italian Edition, as Approved by the Author, by Samuel Putnam. Edited with an Introduction by Victor Robinson. *New York* (Eugenics Publishing Co.), 1935. Pp. xxiv + 335. 9½ × 6¼ inches. $3.00. [Bibliographic footnotes].

THORNDIKE, EDWARD L., and the Staff of the Division of Psychology of the Institute of Educational Research of Teachers College, Columbia University. Adult Interests. *New York* (The Macmillan Co.), 1935. Pp. ix + 265. 7¾ × 5⅛ inches. $3.25.

3. *Psychiatry*

BRILL, A. A. Psychoanalysis and the general practitioner. *Health Examiner*, Vol. 5, pp. 6-11, 1935.

JELLIFFE, SMITH ELY. Affective or emotional participation in disease processes. *Health Examiner*, Vol. 5, pp. 12-14, 1935.

KANNER, LEO. Child Psychiatry. With prefaces by Adolf Meyer and Edwards A. Park. *Springfield, Ill.* (Charles C. Thomas), 1935. Pp. xviii + 527. 9⅞ × 6⅜ inches. $6.00. [Bibliographies throughout].

LORAND, SANDOR. The rôle of anxiety in neuroses. *Health Examiner,* Vol. 5, pp. 15-19, 1935.

MALLET, RAYMOND. La Démence. *Paris* (Armand Colin), 1935. Pp. 176. 6¾ × 4½ inches. 10.50 francs (paper); 12 francs (cloth). [Bibliography of 2 pages].

MEYER, MONROE A. Dream analysis. Its value for psychopathology and psychotherapy. *Health Examiner,* Vol. 5, pp. 13-19, 1935.

WINSLOW, C.-E. A. A community mental hygiene program — the next great opportunity. *Milbank Memorial Fund Quarterly,* Vol. 13, pp. 211-218. 1935.

4. *History and Biography*

BACKMAN, GASTON. Carl Magnus Fürst. *Nordisk Medicinsk Tidskrift,* Bd. 9, pp. 1040-1044, 1935.

CELSUS. Celsus de Medicina. In two volumes. Vol. 1. With an English Translation by W. G. Spencer. *Cambridge* (Harvard University Press), 1935. Pp. xiv + 499. 6½ × 4¼ inches. $2.50 (cloth); $3.50 (leather). [Bibliographic footnotes]. [In Latin and English].

DOMBART, THEODOR. Zum Huswedel-Carmen auf die Hochzeit Kortum-Fabricius vom Jahr 1592. *Mitteilungen des Familienverbandes Bürger (Ansbacher-Schwäbisches Geschlecht Bürger),* Nr. 10, pp. 149-164, 1935. [Bibliography of 6 titles].

HENNIG, R. Der Begriff der Serer in der antiken Literatur. *Zeitschrift für Rassenkunde,* Bd. 2, pp. 90-92, 1935.

HUGHES, PERCY. Naturalists old and new. *Scientific Monthly,* Vol. 40, pp. 265-269, 1935. [Bibliography of 4 titles].

JUCCI, CARLO. Notizie sui Lavori di Carlo Jucci nel Triennio 1930-1933. Pp. 43. 9¾ × 6¾ inches.

MCKEEHAN, IRENE P. Contemporary life in two twelfth-century saints. *University of Colorado Studies,* Vol. 22, pp. 289-305, 1935. [Bibliographic footnotes].

PATCH, EDITH M., and HARRISON E. HOWE. The Work of Scientists. *New York* (The Macmillan Co.), 1935. Pp. viii + 488. 7¼ × 5⅜ inches. 76 cents. ["Book List" of 2 pages].

SCHIEMANN, ELISABETH. Erwin Baur. *Berichten der Deutschen Botanischen Gesellschaft,* Bd. 52, pp. 51-114, 1934. [Bibliography of 133 titles].

UNIVERSIDAD DE BUENOS AIRES, Facultad de Ciencias Médicas. Bibliografia Medica, Argentina, Año 1934. *Buenos Aires,* 1935. Pp. 51 (mimeographed).

WESTAWAY, F. W. The Endless Quest. Three Thousand Years of Science. *Toronto and London* (Blackie and Son), 1934. Pp. xx + 1080 + 51 plates. 8½ × 5⅞ inches. $7.00 (Canada); 21 shillings (Great Britain). [Bibliography at the end of each chapter].

WILLARD, JAMES F. The observance of holidays and vacations by the lower exchequer, 1327-1336. *University of Colorado Studies,* Vol. 22, pp. 281-287, 1935. [Bibliographic footnotes].

WOLF, A., with the co-operation of F. DANNEMANN and A. ARMITAGE. A History of Science, Technology, and Philosophy in the 16th and 17th Centuries. *New York* (The Macmillan Co.), 1935. Pp. xxvii + 692 + 68 plates. 9¾ × 6 inches. [Bibliography at the end of each chapter].

WRIGHT, F. E. The annual meeting of the National Academy of Sciences. *The Scientific Monthly*, Vol. 40, pp. 571-576, 1935. [Portrait].

ZILBOORG, GREGORY. The Medical Man and the Witch During the Renaissance. The Hideyo Noguchi Lectures. *Baltimore* (Johns Hopkins Press), 1935. Pp. x + 215 + 4 plates. 7¾ × 5½ inches. [Bibliographic footnotes].

5. *Sociology, Law, Politics and Religion*

AMERICAN LIBERTY LEAGUE. New Deal laws in federal courts. A review of decisions by the Federal Judiciary and their effect in checking attempts to subvert the American constitutional system. *Document* No. 63. *Washington*, August, 1935. Pp. 21. 9 × 4 inches.

DAUGHERTY, MASON. Sex Worship and Disease (Phallic Worship). A Scientific Treatise on Sex Worship and Its Influence on Religion and Symbolism, with Special Reference to Disease of the Sexual Organs. *7909 Euclid Ave., Cleveland* (Dr. Mason Daugherty), 1935. Pp. 240. 7 × 4½ inches. $3.50. [Bibliography of 2 pages].

DECUGIS, HENRI. Le Destin des Races Blanches. Preface by André Siegfried. *Paris* (Librairie de France), 1935. Pp. vii + 402. 10 × 6½ inches. 38 francs (paper). [Bibliographic footnotes].

GANGULEE, N. The Indian Peasant and his Environment. (The Linlithgow Commission and After). *New York* (Oxford University Press), 1935. Pp. xxxii + 220 + 8 plates. $4.00.

HOARE, SIR SAMUEL. Statement on British foreign policy. *International Conciliation*, No. 312, pp. 371-385, 1935.

HOOVER, HERBERT. The essentials of social growth in America. Address to Graduating Class of Stanford University, June 16, 1935. Pp. 10.

KELLEY, TRUMAN L., and A. C. KREY. Tests and Measurements in the Social Sciences. Report of the Commission on the Social Studies, Part IV. *New York* (Charles Scribner's Sons), 1934. Pp. xiv + 635. 7¾ × 5⅛ inches. $3.00. [Bibliography of 24 pages].

MOSS, JAMES A. Your Rights Under the Constitution. *Washington* (The United States Flag Association), 1935. Pp. 40. 8½ × 5⅜ inches.

PEARL, RAYMOND. Biology and human trends. *Journal of the Washington Academy of Sciences*, Vol. 25, pp. 253-272, 1935.

ROBSON, WILLIAM A. Civilisation and the Growth of Law. A Study of the Relations Between Men's Ideas About the Universe and the Institutions of Law and Government. *New York* (The Macmillan Co.), 1935. Pp. xv + 354. 8½ × 5⅜ inches. $2.50. [Bibliographic footnotes].

SCOTT, JAMES B. The neutrality of the good neighbor. *International Conciliation*, No. 312, pp. 358-370, 1935.

STIMSON, HENRY L. Neutrality and war prevention. *International Conciliation*, No. 312, pp. 347-357, 1935.

SUMNER, WILLIAM GRAHAM. Essays of William Graham Sumner. In two volumes. Edited, with Prefaces, by Albert G. Keller and Maurice R. Davie. *New Haven* (Yale University Press), 1934. Pp.: Vol. 1, xix + 409; Vol. 2, viii + 534. 8¼ × 6 inches. $3.00 per volume. [Bibliography of 28 pages]. [Portrait].

TAYLOR, CLIFFORD C. Agriculture in Southern Africa. *United States Department of Agriculture Technical Bulletin* No. 466. *Washington* (U. S. Government Printing Office), 1935. Pp. 342. 9⅞ × 5¾ inches. 30 cents. [Bibliography of 50 titles].

6. *Economics*

AIKINS, HAROLD E. Bishops and monastic finance in fourteenth-century England. *University of Colorado Studies,* Vol. 22, No. 4, pp. 365-380, 1935. [Bibliographic footnotes].

AMERICAN LIBERTY LEAGUE. Potato Control. An analysis of a ridiculous law making a travesty of constitutional liberties and proposing to inflict upon the American people a bureaucratic despotism, including a new army of Federal snoopers to be paid for through increased living costs for the entire population. *Document No.* 64. *Washington,* 1935. Pp. 11. 9 × 4 inches.

CARPENTER, W. C., JR. A Challenge That Was Accepted. *Wilmington* (E. I. Du Pont de Nemours and Co.), 1935. Pp. 7. 9 × 3⅞ inches.

CENTRAL STATISTICAL BOARD. First Annual Report. Year Ended December 31, 1934. *Washington* (U. S. Government Printing Office), 1935. Pp. x + 47 + folding chart. 9⅞ × 5⅞ inches. 10 cents (paper).

CRANE, JASPER E. The Church and Social Security in Industrial Life. [Remarks at Round Table of Institute of Public Affairs, Charlottesville, Virginia, July 6, 1935.] *Wilmington* (E. I. DuPont de Nemours and Co.), 1935. Pp. 14. 8½ × 3⅜ inches.

CREAMER, DANIEL B. Is Industry Decentralizing? A Statistical Analysis of Locational Changes in Manufacturing Employment 1899-1933. Preface by Carter Goodrich. *Philadelphia* (University of Pennsylvania Press), 1935. Pp. xii + 105. 10 × 6⅝ inches. $1.00. [Bibliographical footnotes].

DAVENPORT, C. B. The influence of economic conditions on the mixture of races. *Zeitschrift für Rassenkunde,* Bd. 1, pp. 17-19, 1935.

FISH, HAMILTON, JR. The confiscatory and socialistic tax bill. [Speech in the House of Representatives August 2, 1935]. Pp. 4.

GIRARD, RICHARD A. The Scope for Uniformity in State Tax Systems. State of New York Special Report of the State Tax Commission No. 8. *Albany* (State Tax Commission), 1935. Pp. 229. [Bibliography of 13 pages].

KISER, CLYDE V. Diminishing family income in Harlem from 1929 to 1932. *Opportunity,* June, 1935, pp. 171-173.

MYERS, WILLIAM S., and WALTER H. NEWTON. The origins of the banking panic of March 4, 1933. *The Saturday Evening Post,* June 8, 15, 22, 29, 1935. Pp. (of reprint) 55.

SCHULTZ, HENRY. Interrelations of demand, price, and income. *Journal of Political Economy,* Vol. 43, pp. 433-481, 1935.

SHOUSE, JOUETT. "Breathing Spells." *Document No.* 65. *Washington* (American Liberty League), 1935. Pp. 10. 9 × 4 inches.

SLOAN, ALFRED P., JR. "Business Bigness." *New York* (General Motors Corp.), July 11, 1935. Pp. 4. 8½ × 6¼ inches.

SOUTH AFRICA. Office of Census Statistics, Pretoria. Census of Industrial Establishments. Statistics of Factories and Productive Industries (excluding Mining and Quarrying) in the Union for the year 1932-33 (Sixteenth Industrial Census, 1934). *Pretoria* (The Government Printer), 1935. Pp. xii + 80. 12¼ × 8¼ inches. 3s. 6d. (paper).

UNITED STATES DEPARTMENT OF LABOR, CHILDREN'S BUREAU. Grants to States for Maternal and Child Welfare Under the Social Security Act. Title V, Parts 1, 2, 3. Maternal and Child-Health Services, Services for Crippled Children, Child-Welfare Services. *Maternal and Child Welfare Bulletin* No. 1. *Washington* (U. S. Government Printing Office), 1935. Pp. iii + 20. 9 × 6 inches. 10 cents (paper).

WINTHROP, STIMSON, PUTNAM and ROBERTS. Opinion upon the constitutionality of the Wheeler-Rayburn Bill (Bill S.2796). Letter to Wendell L. Willkie. *Mutual Life Building, 32 Liberty St., New York City.* Pp. 26.

7. *Education*

BACKMAN, GASTON. Moderna reformsträvanden ifråga om anatomiundervisningen. *Medicinska Föreningens Tidskrift,* N:o 7, pp. 179-193, 1935. [Bibliography of 38 titles].

DAVIS, ROBERT A. Psychology of Learning. A Textbook in Educational Psychology. *New York* (McGraw-Hill Book Co.), 1935. Pp. xii + 489. 8 × 5½ inches. $3.00. [Bibliographic footnotes].

PEARL, RAYMOND. Human biology in schools and colleges. *School and Society,* Vol. 42, pp. 111-118, 1935.

PHILLIPS, MARY E., and LUCY E. COX. The Teaching of Biology. With a Foreword by Sir Percy Nunn. *London* (University of London Press), 1935. Pp. viii + 155. 7⅜ × 4⅞ inches. 4s. 6d. net.

ZIEGLER, PROF. DR. The New Spirit of Military Education. With a Foreword by Major-General Sir Charles Gwynn. *"Friends of Europe" Publications No. 25. London* (Secretary, Friends of Europe, 122 St. Stephen's House, Westminster S. W. 1), 1935. Pp. 21. 8½ × 5½ inches. Free (paper).

8. *Ethnology, Cultural Anthropology, Travel and Exploration*

BEAGLEHOLE, ERNEST and PEARL. Hopi of the Second Mesa. *Memoirs of the American Anthropological Association,* No. 44. *Menasha, Wis.* (American Anthropological Assoc.), 1935. Pp. 65. 9⅝ × 6⅜ inches. 75 cents (paper). [Bibliographic footnotes].

BENNETT, WENDELL C., and ROBERT M. ZINGG. The Tarahumara: An Indian Tribe of Northern Mexico. *Chicago* (University of Chicago Press), 1935. Pp. xix + 412 + folding table. 8⅛ × 5⅜ inches. $4.00. [Bibliography of 85 titles].

BROWN, G. GORDON, and A. MCD. BRUCE HUTT. Anthropology in Action. An Experiment in the Iringa District of Iringa Province Tanganyika Territory. *New York* (Oxford University Press), 1935. Pp. xviii + 272 + folding map. 7¼ × 4¾ inches. $2.75.

HAMBLY, WILFRID D. Culture Areas of Nigeria. Frederick H. Rawson-Field Museum Ethnological Expedition to West Africa, 1929-30. *Field Museum of Natural History Publication* 346. *Chicago* (Field Museum of Natural History). Pp 140 + 68 plates. 9½ × 6¼ inches. $2.00. [Bibliography of 14 pages].

HUXLEY, ELSPETH. White Man's Country. Lord Delamere and the Making of Kenya. Volume I, 1870-1914; Volume II, 1914-1931. *New York* (The Macmillan Co.), 1935. Pp.: Vol. I, xiii + 315 + 12 plates and 2 folding maps; Vol. II, vii + 333 +12 plates and 2 folding maps. 8¾ × 5¾ inches. $10.00 for the two volumes.

HYATT, HARRY M. Folk-lore from Adams County, Illinois. *New York* (Alma Egan Hyatt Foundation), 1935. Pp. xvi + 723. 9⅝ × 6⅛ inches. $6.00.

MONFREID, HENRY DE. Hashish. Translated from the French by Helen B. Bell. *London* (Methuen and Co.), 1935. Pp. vii + 284 + 9 plates. 8½ × 5½ inches. 10s. 6d. net.

SHATTUCK, GEORGE C. [Editor]. Handbook of Travel. Prepared for the Harvard Travellers Club. Second Edition. Revised and Enlarged. *Cambridge* (Harvard University Press), 1935. Pp. viii + 510. 6⅞ × 4¾ inches. $3.00. [List of reference books at end of each chapter].

SPECK, FRANK G. Naskapi. The Savage Hunters of the Labrador Peninsula. *Norman* (University of Oklahoma Press), 1935. Pp. 248 + 20 plates. 9 × 6 inches. $3.50. [Bibliographic footnotes].

WEGNER, RICHARD N. Indianer-Rassen und vergangene Kulturen. Betrachtungen zur Volksentwicklung auf einer Forschungsreise durch Süd- und Mittelamerika. *Stuttgart* (Ferdinand Enke), 1934. Pp. viii + 320 + 128 plates. 10¾ × 7¼ inches. 15 marks (paper); 17.50 marks (cloth). [Bibliographic footnotes].

IV. SOMATOLOGY AND CONSTITUTION

1. *Anatomy*

HARRISON, Ross G. Heteroplastic grafting in embryology. *The Harvey Lectures*, 1933-34, pp. 116-157 + 6 plates, 1935. [Bibliography of 66 titles].

JUCCI, CARLO. La Legge di Mendel e i cromosomi. *Memorie d. Pont. Accad. d. Sci., Nuovi Lincei*, Vol. 16, pp. 733-872, 1932. [Bibliography of 5½ pages].

NEWMAN, H. H. Dermatoglyphics and the problem of handedness. *American Journal of Anatomy*, Vol. 55, pp. 277-322, 1934. [Bibliography of 17 titles].

RANSON, STEPHEN W. The Anatomy of the Nervous System from the Standpoint of Development and Function. Fifth Edition, Revised. *Philadelphia* (W. B. Saunders Co.), 1935. Pp. 501. 9⅞ × 6½ inches. $6.50. [Bibliography of 10 pages].

SCOTT, GEORGE G., and JAMES I. KENDALL. The Microscopic Anatomy of Vertebrates. *Philadelphia* (Lea and Febiger), 1935. Pp. 306. 9¼ × 5½ inches. $3.75. [Bibliography at the end of each chapter].

SHUMWAY, WALDO. Introduction to Vertebrate Embryology. A Textbook for Colleges and Universities. Third Edition, Revised and Enlarged. *New York* (John Wiley and Sons), 1935. Pp. xii + 390. 9 × 5¾ inches. $4.00 net. [Bibliography at the end of each chapter].

2. *Physical Anthropology and Anthropometry*

AMERICAN ASSOCIATION OF PHYSICAL ANTHROPOLOGISTS. Proceedings of the sixth annual meeting. *American Journal of Physical Anthropology*, Vol. 20, pp. 1-11, 1935.

BOAS, FRANZ. The tempo of growth of fraternities. *Proceedings of the National Academy of Sciences*, Vol. 21, pp. 413-418, 1935. [Bibliography of 5 titles].

CONSOLI, VITO. Medie ponderali e metriche dei neonati della provincia di Catania. *Genus*, Vol. 1, pp. 177-179, 1934.

DAVENPORT, CHARLES B. On the need of checking in anthropometry. *A Decade of Progress in Eugenics, Scientific Papers of the Third International Congress of Eugenics*, 1932, pp. 45-46.

v. EICKSTEDT, EGON. Anlage und Durchführung von rassenkundlichen Gauuntersuchungen. *Zeitschrift für Rassenkunde*, Bd. 2, pp. 1-32, 1935.

FRASSETTO, FABIO. Projet d'une fiche standard pour l'examen biométrique des sportifs. *S. A. S. (Bollettino del Comitato Internazionale per l'Unificazione dei Methodi e per la Sintesi in Antropologia ed Eugenica)*, Vol. 1, No. 2, pp. (of reprint) 10 +folding chart. [Bibliography of 28 titles].

GAVAZZI, M. Die Herkunft der bosnischen Mohammedaner. *Zeitschrift für Rassenkunde*, Bd. 2, p. 93, 1935.

GOVAERTS, A. Un'inchiesta su l'aumento della statura e la diminuzione del perimetro toracico. *Genus*, Vol. 1, pp. 180-181, 1934.

GRAY, H. Body-build in 248 negro convicts. *Zeitschrift für Rassenkunde*, Bd. 2, pp. 45-52, 1935. [Bibliography of 9 titles].

HRDLIČKA, ALEŠ. Ear exostoses. *Smithsonian Miscellaneous Collections*, Vol. 93, No. 6, *Publication* 3296. Pp. iv + 100 + 5 plates. 9¾ × 6⅜ inches. 1935. [Bibliography of 12 pages].

MÜLLER, H. W. Die Kleinschädelformen Südasiens. Ein Beitrag zum Kleinwuchsproblem. *Zeitschrift für Rassenkunde*, Bd. 2, pp. 52-90, 1935.

SCHWIDETZKY, I. Methoden zur Kontrolle der v. Eickstedtschen Rassenformeln. *Zeitschrift für Rassenkunde*, Bd. 2, pp. 32-40, 1935. [Three bibliographic footnotes].

SCHWIDETZKY, I. Ostische Rasse — aber welche? *Zeitschrift für Rassenkunde*, Bd. 2, pp. 93-94, 1935.

ŠKERLJ, B. Ein neuer Beckenindex. *Zeitschrift für Rassenkunde*, Bd. 2, pp. 92-93, 1935.

SPEISER, FELIX. Über infantile Sexualmerkmale bei Kleinwuchsrassen. *Zeitschrift für Rassenkunde*, Bd. 2, pp. 40-45, 1935. [Bibliography of 6 titles].

3. *Constitution*

MENGARELLI, CARLO. La Costituzione nelle Aristocrazie Italiane. *Pubblicazioni della Università Cattolica del Sacro Cuore. Statistica, Vol. VIII. Milano* (Università Cattolica del Sacro Cuore), 1935. Pp. viii + 165. 10 × 6½ inches. L. 15 (paper). [Bibliographic footnotes].

PENDE, N., S. GUALCO, and F. LANDOGNA CASSONE. Le varianti raziali umane viventi in Liguria. Prime ricerche di biotipologia metrica e funzionale. *Genus*, Vol. 1, pp. 91-108 + 5 plates, 1934.

V. PHYSIOLOGY AND BIOCHEMISTRY

1. *Physiology*

ALLEN, EDGAR, A. W. DIDDLE, and J. H. ELDER. Theelin content of pregnancy urine and placenta of the chimpanzee. *American Journal of Physiology*, Vol. 110, pp. 593-596, 1935. [Bibliography of 10 titles].

BERETERVIDE, J. J., and S. ROSENBLATT. Glandulas Endocrinas y Prostitucion. Introduction by Mariano R. Castex. *Buenos Aires* ("El Ateneo"), 1935. Pp. 254. 9 × 6½ inches. [Bibliography of 39 titles].

BINET, LÉON. Six Conférences de Physiologie. *Paris* (Masson et Cie), 1935. Pp. 73. 9¾ × 6¾ inches. 12 francs (paper). [Bibliography of 6 titles].

BINET, LÉON, with the collaboration of MM. ARTHUS, E. BENHAMOU, R. FABRE, J. HAGUENAU, MME. C. JERAMEC, MM. J. GOSSET, M. KAPLAN, J. MARIE, J. PATEL, A. SICARD, and M. SUREAU. Leçons de Physiologie Médico-Chirurgicale. *Paris* (Masson et Cie), 1935. Pp. 245. 9¾ × 6¾ inches. 40 francs (paper). [Bibliographic footnotes throughout].

DUBUISSON, M. Les Ionogrammes de la Contraction Musculaire (Technique d'enrégistrement et résultats). *Actualités Scientifiques et Industrielles, 245. Exposés de Biologie Générale en rapport avec la Cytologie, IV. Paris* (Hermann et Cie), 1935. Pp. 34. 10 × 6½ inches. 12 francs (paper). [Bibliography of 29 titles].

ELDER, J. H. The upper limit of hearing in chimpanzee. *American Journal of Physiology*, Vol. 112, pp. 109-115, 1935. [Bibliography of 9 titles].

EPHRUSSI, BORIS. Phénomènes d'Intégration dans les Cultures des Tissus. *Actualités Scientifiques et Industrielles, 240. Exposés de Biologie (Embryologie et Histogenèse)* IV. *Paris* (Hermann et Cie), 1935. Pp. 24. 10 × 6½ inches. 8 francs (paper). [Bibliography of 21 titles].

HARRISON, Ross G. Correlation in the development and growth of the eye studied by means of heteroplastic transplantation. *Wilhelm Roux' Archiv für Entwicklungsmechanik der Organismen*, Bd. 120, pp. (of reprint) 55, 1929. [Bibliography of 39 titles].

HARRISON, Ross G. Heteroplastic transplantation in amphibian embryos. *X^e Congrès International de Zoologie*, pp. 642-650, 1929. [Bibliography of 6 titles].

HARRISON, Ross G. On the status and significance of tissue culture. *Archiv für experimentelle Zellforschung*, Bd. 6, pp. 4-27, 1928. [Bibliographic footnotes].

PITT, F. H. G. Reports of the Committee upon the Physiology of Vision. XIV. Characteristics of Dichromatic Vision. With an Appendix on Anomalous Trichromatic Vision. *Medical Research Council, Special Report Series*, No. 200. *London* (His Majesty's Stationery Office), 1935. Pp. 58. 9½ × 6 inches. 1s. 3d. net (paper). [Bibliography of 25 titles].

ROBERTS, LYDIA J. Nutrition Work with Children. Revised and Enlarged Edition. *Chicago* (University of Chicago Press), 1935. Pp. xix + 639. 8¼ × 5½ inches. [Bibliography at the end of each chapter].

VISSCHER, MAURICE B., and PAUL W. SMITH. Experimental Physiology. With Anatomical and Mechanical Illustrations and an Appendix of Technical Data. *Philadelphia* (Lea and Febiger), 1935. Pp. 191. 9¼ × 5⅞ inches. $3.25. [Bibliography at the end of several chapters].

2. *Senescence, Senility and Longevity*

BILL, ANNIE C. The Conquest of Death. An Imminent Step in Evolution. *Boston* (A. A. Beauchamp), 1935. Pp. 432. 7¾ × 5¼ inches. $3.00.

3. *Biochemistry*

BARY, P., M. DELÉPINE, CH. DUFRAISSE, G. DUPONT, V. GRIGNARD, M. LECAT, R. LOCQUIN, CH. MAUGUIN, H. PARISELLE, J. TIMMERMANS. Published under the direction of V. GRIGNARD and PAUL BAUD. Traité de Chimie Organique. Tome I. Analyse Organique, Azéotropisme et Distillation, État Cristallin et État Colloidal, Composé Défini et Corps Pur, Construction de l'Édifice Moléculaire, Association des Atomes. Chaînes Ouvertes et Chaînes Fermées. Groupements Fonctionnels. Représentation des Édifices Chimiques. Isomérie. Nomenclature. *Paris* (Masson et Cie), 1935. Pp. xix + 1149. 9¾ × 6¼ inches. 220 francs. [Extensive bibliographies throughout].

SHINOHARA, KAMENOSUKE, and MARTIN KILPATRICK. A kinetic study of the oxidation of cystine by iodine. *Journal of the American Chemical Society*, Vol. 56, pp. 1466-1472, 1934. [Bibliography of 17 titles].

WURMSER, RENÉ. L'Électroactivité dans la Chimie des Cellules. *Actualités Scientifiques et Industrielles, 244. Exposés de Biophysique,* II. *Paris* (Hermann et Cie), 1935. Pp. 82. 10 × 6½ inches. 18 francs (paper). [Bibliography of 96 titles].

4. *Pharmacology*

BLISS, C. I. The comparison of dosage-mortality data. *Annals of Applied Biology*, Vol. 22, pp. 307-333, 1935. [Bibliography of 5 titles].

BLISS, C. I. Estimating the dosage-mortality curve. *Journal of Economic Entomology*, Vol. 28, pp. 646-647, 1935.

VI. PATHOLOGY, CLINICAL MEDICINE AND SURGERY

COOPER HOSPITAL. Forty-seventh Annual Report of The Cooper Hospital and the School for Nurses, for the Year Ending December 31, 1934. *Camden, N. J.*, 1935. Pp. 38 + 5 plates. 6 × 9 inches.

DEGRAFF, ARTHUR C., and CLAIRE LINGG. The course of rheumatic heart disease in adults. I. Factors pertaining to age at initial infection, the development of cardiac insufficiency, duration of life and cause of death. II. The influence of the type of valvular lesion on the course of rheumatic heart disease. III. The influence of auricular fibrillation on the course of rheumatic heart disease. *The American Heart Journal*, Vol. 10, pp. 459-485; 630-642; 1935. [Bibliography of 47 titles].

FOLDES, EUGENE. A new concept of Ménière's disease and its response to anti-retentional therapy. *American Journal of Digestive Diseases and Nutrition*, Vol. 2, pp. 243-247, 1935. [Bibliography of 6 titles].

JORDAN, EDWIN O. A Textbook of General Bacteriology. Eleventh Edition, Entirely Reset. *Philadelphia* (W. B. Saunders Co.), 1935. Pp. 825. 9⅛ × 5⅝ inches. $6.00. [Bibliographic footnotes throughout].

PALAZZOLI, M. L'Impuissance Sexuelle chez l'Homme. Étiologie. Diagnostic. Traitement. [Preface by Prof. Lugueu]. *Paris* (Masson et Cie), 1935. Pp. vii + 284. 10 × 6½ inches. 45 francs (paper). [Bibliography of 50 titles].

REVISTA DE MEDICINA aplicado a los Deportes, Educacion Fisica y Trabajo. Vol. 1, No. 1, June, 1935. *Editorial Offices: Remo Michettoni e Hijo, Diaz Velez 4397, Buenos Aires, Argentina.* Published Quarterly. Subscription price (for members of the F.A. de la U.I. de M. del D. and the U.I. de M. del D. and its affiliations), $4.00; (for physicians and institutions) $8.00. Single numbers $2.00.

DE RIVAS, DÁMASO, in collaboration with CARLOS T. DE RIVAS. Clinical Parasitology and Tropical Medicine. *Philadelphia* (Lea and Febiger), 1935. Pp. 367. 9¼ × 5⅝ inches. $5.00. [Bibliography of 3 pages].

TODD, JAMES C., and ARTHUR H. SANFORD. Clinical Diagnosis by Laboratory Methods: a Working Manual of Clinical Pathology. Eighth Edition, Thoroughly Revised. *Philadelphia* (W. B. Saunders Co.), 1935. Pp. 792. 9⅛ × 5¾ inches. $6.00. [Bibliographic footnotes throughout].

TULL, MYRON G. Extensive diphtheritic membranes removed and photographed. *Journal of the American Medical Association*, Vol. 104, pp. 1967-68, 1935. [Bibliography of 1 title].

ZONDEK, HERMANN. The Diseases of the Endocrine Glands. Third Edition, Revised and Enlarged. Translated by Carl Prausnitz. *Baltimore* (William Wood and Co.), 1935. Pp. xi + 492. 9½ × 6½ inches. $11.00. [Bibliography of 32 pages].

VII. METHODOLOGY

1. *Mensurational and Observational*

PIJPER, ADRIANUS. On measuring red blood-cells, with special reference to a new diffraction apparatus. *The Lancet*, May 18, 1935, pp. 1152-1154. [Bibliography of 10 titles].

2. *Mathematical and Statistical*

FRASSETTO, FABIO. Enquête sur la valeur limite entre normalité et anormalité dans la classification des caractères anthropométriques et biométriques. *S.A.S. Bollettino del Comitato Internazionale per l'Unificazione dei Metodi e per la Sintesi in Antropologia ed Eugenica*, Vol. 1, No. 2, pp. (of reprint) 13 + folding chart. [Bibliography of 2 titles].

HAMBURGER, L. Over Volledige Groefifuncties, de Photographische in het Bijzonder. *Chemisch Weekblad*, Deel 30, pp. 115-138, 1933. [Bibliographic footnotes].

KOŁODZIEJCZYK, STANISŁAW. On an important class of statistical hypotheses. *Biometrika*, Vol. 27, pp. 161-190, 1935. [Bibliography of 14 titles].

KOŁODZIEJCZYK, STANISŁAW. O pewnej klasie hipotez statystycznych związanych z metodą najmniejszych kwadratów. [Sur une classe des hypothèses statistiques liées à la théorie des moindres carrés.] *Kwartalnika Statystycznego, Wydawanego Przez Główny Urząd Statystyczny Rzeczypospolitej Polskiej*, Vol. 11, No. 3-4, pp. (of reprint) 71, 1934. [Bibliography of 25 titles]. [In Polish with French summary].

KOZAKIEWICZ, W. Sur les fonctions caractéristiques et leur application aux théorèmes limites du calcul des probabilités. *Annales de la Société Polonaise de Mathématique*, Vol. 13, pp. 24-43, 1934.

KULLBACK, SOLOMAN. A note on the analysis of variance. *The Annals of Mathematical Statistics*, Vol. 6, pp. 76-77, 1935.

MATUSZEWSKI, T. O Pewnych zagadnieniach bakterjologicznych, dających się rozwiązac zapomocą metod statystyki matematycznej. [Sur quelques problèmes de bactériologie, qui pouvent être résolus à l'aide des méthodes de la statistique mathématique]. *Medyzyny Doświadczalnej i Społecnej*, Vol. 18, No. 5-6, pp. (of reprint) 16, 1934. [Bibliography of 25 titles]. [In Polish with French summary].

MATUSZEWSKI, T., J. NEYMAN and J. SUPIŃSKA. Statistical studies in questions of bacteriology. Part I. The accuracy of the "dilution method." *Journal of the Royal Statistical Society, Supplement*, Vol. 2, pp. 63-82, 1935.

NEYMAN, JERZY. O zagadnieniach przemysłu rolnego, wymagających zastosowania metod statystycznych. [Problems of chemical engineering requiring the application of statistical methods]. *Roczników Nauk Rolniczych i Leśnych*, Vol. 33, pp. 257-272, 1934. [In Polish with English summary].

NEYMAN, JERZY. On the different aspects of the representative method: the method of stratified sampling and the method of purposive selection. *Journal of the Royal Statistical Society*, Vol. 47, pp. 558-625, 1934.

ODELL, CHARLES W. Statistical Method in Education. *New York* (D. Appleton-Century Co.), 1935. Pp. xx + 457. 7⅞ × 5¼ inches. $3.50. [Bibliographic footnotes].

PETERS, CHARLES C., and WALTER R. VANVOORHIS. Statistical Procedures and Their Mathematical Bases. *State College* (School of Education, Pennsylvania State College), 1935. Pp. vii + 363. 8¼ × 5¼ inches. $1.25. [Bibliographic footnotes]

REED, H. S., and J. DUFRÉNOY. La croissance phénomène autocatalytique. *Revue générale des Sciences*, T. 45, pp. 565-569, 1934. [Bibliography of 14 titles].

SUPINSKA, J. Porównanie dokładności oznaczania liczby drobnoustrojów na jednostkę objętości zapomocą róznych modyfikacyj metody rozcieńczeń. [Comparaison de la précision avec laquelle on peut déterminer le nombre des microorganismes dans l'unité de volume au moyen de certaines modifications de la méthode des solutions]. *Medycyny Doświadczalnej i Społecznej*, Vol. 18, Nos. 5-6, pp. (of reprint) 12, 1934. [Bibliography of 12 titles]. [In Polish, with French summary].

3. *Other and General*

v. Eickstedt, Egon. Das Anthropologische Institut zu Breslau. *Zeitschrift für Rassenkunde,* Bd. 2, pp. 94-96, 1935.

Foley, John P., Jr. An apparatus for restraining monkeys and other lesser primates. *American Journal of Psychology,* Vol. 47, pp. 312-315, 1935. [Bibliography of 1 title].

Lilly Research Laboratories. Dedication. *Indianapolis, Ind.* (Eli Lilly and Co.), 1935. Pp. xii + 128 + color plate. 12 × 9¼ inches.

Peacock, H. Alan. Elementary Microtechnique. *New York* (Longmans, Green and Co.), 1935. Pp. vii + 200. 7¼ × 4⅞ inches. $1.90. [Bibliography of 18 titles].

VIII. GENERAL AND MISCELLANEOUS

Carrel, Alexis. Man the Unknown. *New York* (Harper and Bros.), 1935. Pp. xv + 346. 8½ × 5¾ inches. $3.50.

Fitzpatrick, Frederick L., and Ralph E. Horton. Student's Manual in Biology. *Boston* (Houghton Mifflin Co.), 1935. Pp. iv + 155. 11 × 8 inches. 48 cents (paper).

Henry Lester Institute of Medical Research. Annual Report, 1934. *Shanghai* 1935. Pp. 64. 9½ × 6¾ inches.

Lakhovsky, Georges. La Matière. *Paris* (Gaston Doin et Cie), 1934. Pp. 232. 7½ × 5½ inches. 24 francs (paper). [Bibliographic footnotes].

Lehmann, Fritz M. Logik und System der Lebenswissenschaften. *Leipzig* (Johann Ambrosius Barth), 1935. Pp. vii + 124. 9¼ × 6¼ inches. 7.30 marks (paper). [Bibliography of 116 titles].

Milbank Memorial Fund. The Thirtieth Year in Review. Report for the Year Ended December 31, 1934. *New York,* 1935. Pp. 60. [Portrait].

Rice, Edward L. An Introduction to Biology. *Boston* (Ginn and Co.), 1935. Pp. xii + 602. 8¼ × 5½ inches. $3.20. [Bibliography of 5 pages].

Whitfield, F. G. Sarel, and A. H. Wood. An Introduction to Comparative Zoology. A Text-book for Medical and Science Students. With a Foreword by Maj. Sir Robert Archibald. *Philadelphia* (P. Blakiston's Son and Co.), 1935. Pp. x + 354. 9¾ × 7⅜ inches. $5.00. [Bibliography at the end of several chapters].

INDEX

"Adolescent acceleration" of growth, 330
Adrenal weight, 369
Age at death of mental patients, 354
  composition of population, 536
Agglutinogens M and N, heredity of, 222
Alcoholic psychoses, 496
Amalgamation of ethnic groups, 437
Anatomy (Recent Literature), 139, 291, 458, 627
Arteriosclerosis, cerebral, 488

Baldness, inheritance of, 608
BEARD, HOWARD H., Coefficients of Correlation between the Nitrogenous Constituents of the Urine after Ingestion of Low, Normal and High Protein Diets, 419-429
Beeton, M., 393
BEHAVIOR (Recent Literature), 132, 284, 452, 622
Bell, A. G., 395
Berkeley, California, 543
BERNARD, JESSIE, Some Biological Factors in Personality and Marriage, 430-436
Bi-acromial width, 152
Biochemistry (Recent Literature), 145, 295, 463, 630
Birth Control (Recent Literature), 131, 283, 452, 621
BOAS, FRANZ, Studies in Growth, 303-318
Body length of mental patients, 362
Bone weight in human carpus, 108
BONIN, GERHARDT VON, European Races of the Upper Palaeolithic, 196-221
BURKS, BARBARA S., and JONES, HAROLD E., A Study of Differential Fertility in Two California Cities, 539-554
BURROW, TRIGANT, Neuropathology and the Internal Environment, 74-94

California cities, differential fertility in, 539
Cap Blanc skeleton, 197
Carmichael, H. T., 24
Carpus, bone weight in, 108
Coefficient of group divergence, 99
  racial likeness, 95
COLLINS, SELWYN D., and PENNELL, ELLIOTT H., The Use of the Logistic Curve to Represent the Prevalence of Defective Vision among Persons of Specific Ages above 30 years, 257-266
Comparison of groups, 95
Constitution (Recent Literature), 142, 292, 461, 628

Correlation of oral-rectal temperature, 38
CUMMINS, HAROLD, Morphology of the Palmar Hypothenar Dermatoglyphics in Man, 1-23

DAVENPORT, C. B., The Development of Trunk Width and the Trunk Width Index, 151-195
Dementia praecox, 503
DE PORTE, J. V., and PARKHURST, ELIZABETH, Homicide in New York State, 47-73
Dermatoglyphics, 1
Differential fertility, 539

Economics (Recent Literature), 137, 288, 456, 625
Education (Recent Literature), 138, 289, 457, 626
Endocrine organs and mental disease, 350, 555
  pattern of insane, 594
Environment, internal, 74
Environment of Man (Recent Literature), 125, 276, 447, 618
Epiphysis weight, 581
Ethnic groups, amalgamation of, 437
Ethnology, Cultural Anthropology, Travel and Exploration (Recent Literature), 138, 290, 458, 626
Eugenics (Recent Literature), 125, 275, 446, 618
EVOLUTION AND GENETICS (Recent Literature), 121, 272, 443, 616

Face width, 313
Fertility, differential, 539
  and longevity, 392
FREEMAN, BETTIE C., Fertility and Longevity in Married Women Dying after the End of the Reproductive Period, 392-418
Freeman, W., 350, 555

Gene-frequency method, 608
GENERAL AND MISCELLANEOUS (Recent Literature), 150, 300, 469, 633
General paralysis, 492
Genetics (Recent Literature), 122, 274, 445, 617
Gonad weight, 571
Gooch, M., 350, 555
GROUP BIOLOGY (Recent Literature), 125, 276, 447, 618
Groups, comparison of, 95
Growth, 303, 319

HIMES, NORMAN E., *Marriage Hygiene*: A Scientific Quarterly, 119-120
History and Biography (Recent Literature), 133, 285, 454, 623
Homicide in New York State, 47
Hufeland, C. W., 393
Human Evolution (Recent Literature), 122, 273, 444, 616

Human Heredity (Recent Literature), 123, 275, 446, 617
Humphry, G. M., 393
Hypophysis weight, 565
Hypothenar dermatoglyphics, 1

Individual Psychology (Recent Literature), 132, 284, 453, 622
Inheritance, human, 608
Inter-cristal width, 164
Internal environment, 74
Iowa, population of, 514

Jones, H. E., 539

KARPINOS, BERNARD D., A Stationary Population (A Study of Iowa Population), 514-538
KROGMAN, WILTON MARION, Vital Data on the Population of the Seminole Indians of Florida and Oklahoma, 335-349

LINDER, FORREST E., and CARMICHAEL, HUGH T., A Biometric Study of the Relation between Oral and Rectal Temperatures in Normal and Schizophrenic Subjects, 24-46
Logistic curve, 257
Longevity and fertility, 392
Lung volume, prediction of, 251

MALZBERG, BENJAMIN, Mental Disease among Negroes in New York State, 471-513
Manic-depressive psychoses, 500
Marriage and Divorce (Recent Literature), 131, 283, 452
Marriage and personality, 430
Mental disease and endocrine organs, 350, 555
  among Negroes, 471
METHODOLOGY (Recent Literature), 148, 299, 467, 631
Migration (Recent Literature), 127, 278, 449, 619
Miner, J. R., 95
Morbidity and Epidemiology (Recent Literature), 130, 281, 451, 621
Morphology of palmar hypothenar dermatoglyphics, 1
Mortality and General Vital Statistics (Recent Literature), 129, 280, 450, 620
Mortality of Seminole Indians, 341

Natality, Fecundity, Fertility (Recent Literature), 130, 283, 452, 621
Negroes, mental disease among, 471
Neuropathology and internal environment, 74
New York State, homicide in, 47
  mental disease among Negroes in, 471
Nitrogenous constituents of urine, 419
NOTES, 119-120, 267-271

Oakland, California, 542
Oral temperature, 24
Ovary weight, 578

Palaeolithic, races of, 196
Palmar dermatoglyphics, 1
PALMER, CARROLL E., and REED, LOWELL J., Anthropometric Studies of Individual Growth. I. Age, Height, and Rate of Growth in Height, Elementary School Children, 319-334
Parathyroid weight, 555
Parkhurst, E., 47
Paternity, exclusion of, 236
PATHOLOGY, CLINICAL MEDICINE AND SURGERY (Recent Literature), 146, 297, 465, 630
PEARL, RAYMOND, GOOCH, MARJORIE, and FREEMAN, WALTER, A Biometric Study of the Endocrine Organs in Relation to Mental Disease, 350-391, 555-607
and MINER, JOHN R., On the Comparison of Groups in Respect of a Number of Measured Characters, 95-107
Pearson, K., 393
Pelvic width, 164
Pennell, E. H., 257
Personality and marriage, 430
Pharmacology (Recent Literature), 146, 297, 465, 630
Physical Anthropology and Anthropometry (Recent Literature), 141, 291, 459, 628
PHYSIOLOGY AND BIOCHEMISTRY (Recent Literature), 143, 293, 461, 629
Pineal weight, 581
Pituitary weight, 565
Population (Recent Literature), 128, 278, 449, 620
Population growth of Seminole Indians, 335
stationary, 514
Powys, A. O., 395
Prehistory and Archeology (Recent Literature), 122, 273, 444, 616
Presbyopia, development of, 260
Psychiatry (Recent Literature), 133, 285, 453, 622
Public Health and Hygiene (Recent Literature), 126, 276, 447, 619
PYLE, S. IDELL, Bone Weight in the Human Carpus, 108-118

Racial and Genetic Psychology (Recent Literature), 132, 284, 452, 622
RECENT LITERATURE, 121-150, 272-301, 443-469, 616-633
Rectal temperature, 24
Reed,. L. J., 319
ROSAHN, PAUL D., A Graphic Method for Representing the Significance of the Difference Between Means, 267-271
ROWE, ALLAN WINTER, Vital Function Studies. XIII. The Influence of Abnormal Sitting Height Indices on Weight and Lung Volume Predictions, 240-255

Scapular angle, 183
Schizophrenics, temperature of, 24
Seminole Indians, 335
Senescence, Senility and Longevity (Recent Literature), 144, 295, 463, 630
Senile psychoses, 487
Sex-influenced factors, 608
Shoulder width, 152
Sitting height index, 240
SNYDER, LAURENCE H., and YINGLING, HAL C., Studies in Human Inheritance XII, The Application of the Gene-Frequency Method of Analysis to Sex-Influenced Factors, with Especial Reference to Baldness, 608-615
Sociology, Law, Politics and Religion (Recent Literature), 136, 286, 455, 624
SOMATOLOGY AND CONSTITUTION (Recent Literature), 139, 291, 458, 627
Specific fertility rates, 517
Stationary population, 514
Syphilis, cerebral, 495

Temperature, oral and rectal, 24
Testis weight, 574
Thymus weight, 585
Thyroid weight, 383
Trunk width, 151
Twins, agglutinogens M and N in, 237

Urine, nitrogenous constituents of, 419

Vision, defective, 257
Vital function, 240

Weight of mental patients, 366
  prediction of, 243
WIENER, ALEXANDER S., Heredity of the Agglutinogens M and N of Landsteiner and Levine. IV. Additional Theoretico-Statistical Considerations, 222-239
WILLOUGHBY, RAYMOND ROYCE, The Amalgamation of Ethnic Groups, 437-442

Yingling, H. C., 608
Yule, G. U., 393